DOCUMENT RESUME

ED 227 155 TM 830 168

TITLE	Changes in Student Performance by Achievement Class and Modal Grade: A Different Look at Assessment Data in Reading, Science and Mathematics. Technical Report.
INSTITUTION	Education Commission of the States, Denver, Colo. National Assessment of Educational Progress.
SPONS AGENCY	Education Commission of the States, Denver, Colo.; National Inst. of Education (ED), Washington, DC.
REPORT NO	ISBN-0-89398-479-5; NAEP-SY-RSM-21
PUB DATE	Dec 82
CONTRACT	OEC-0-74-0506
GRANT	NIE-G-80-000g
NOTE	101p.; Some tables contain small print. For related document, see TM 830 180.
AVAILABLE FROM	National Assessment of Educational Progress, 1860 Lincoln St., Suite 300, Denver, CO 80295 ($9.00).
PUB TYPE	Reports - Research/Technical (143) -- Statistical Data (110)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	*Achievement Rating; Achievement Tests; *Educational Assessment; Elementary Secondary Education; *Federal Programs; *Grading; High Achievement; Low Achievement; Mathematics Achievement; Racial Differences; Reading Achievement; Science Education; Student Evaluation; *Test Results
IDENTIFIERS	*National Assessment of Educational Progress

ABSTRACT

An overview of results from the National Assessment of Educational Progress in reading, science, and mathematics for American students during the 1970's -- ages 9, 13, and 17 -- is presented. Results are for three learning areas commonly accepted as critical to the maintenance of our increasingly technological society. Data on performance have been analyzed using "achievement class" and modal grade -- a new departure for National Assessment. The report attempts to answer such questions as: Were the performance patterns different in these three areas? Were the patterns different for low achievers and for high achievers? Were the performance patterns different for students in their modal grades and students below modal grades? Primary type of information provided by report: Results (Technical) (Overview). (Author/PN)

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TECHNICAL REPORT
Changes in Student Performance by Achievement Class and Modal Grade:

A Different Look at Assessment Data in Reading, Science and Mathematics

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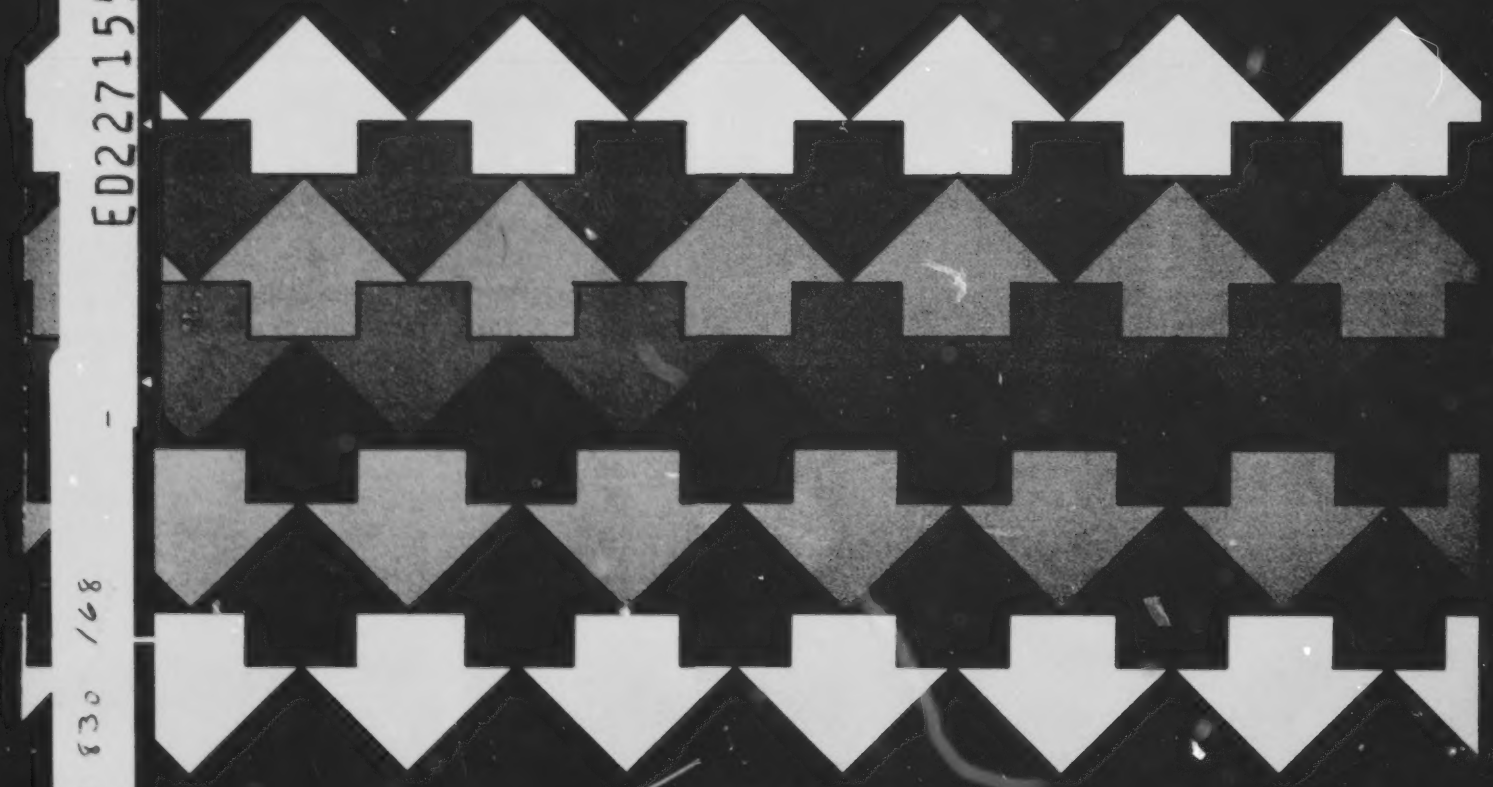

National Assessment of Educational Progress

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A Different Look at Assessment Data in Reading, Science and Mathematics

No. SY-RSM-21

National Assessment of Educational Progress

Education Commission of the States
Suite 700, 1860 Lincoln Street
Denver, Colorado 80295

December 1982

The National Assessment of Educational Progress is funded by the National Institute of Education, under a grant to the Education Commission of the States. It is the policy of the Education Commission of the States to take affirmative action to prevent discrimination in its policies, programs and employment practices.

Library of Congress
Catalog Card Number: 72-183665

Although a few early National Assessment reports have individual catalog card numbers, all recent reports have been assigned the above series number.

ISBN 0-89398-479-5

The National Assessment of Educational Progress is an education research project mandated by Congress to collect and report data, over time, on the performance of young Americans in various learning areas. National Assessment makes available information on assessment procedures and materials to state and local education agencies and others.

The work upon which this publication is based was performed pursuant to Contract No. OEC-0-74-0506 of the National Center for Education Statistics and the National Institute of Education; also, Grant No. NIE-G-80-0003 of the National Institute of Education. It does not, however, necessarily reflect the views of those agencies.

TABLE OF CONTENTS

List of Tables and Exhibits..... v

Foreword..... xi

Acknowledgments.....xiii

Chapter 1 Introduction..... 1
The Data Base and the Analysis..... 2
The Achievement-Class Variable..... 3
Modal Grade..... 4
Organization of This Report..... 4

Chapter 2 Changes in Proportions of Students Within Achievement Classes..... 5
Introduction..... 5
Regions, Sexes, Races..... 7
Title I, Type of Community, Size of Community and Percent-White Enrollment..... 10
Level of Parental Education and Reading Resources in the Home..... 17
Summary..... 20

Chapter 3 Performance Changes in Reading, Science and Mathematics for 9-, 13- and 17-Year-Olds..... 23
Introduction..... 23
Changes in Performance..... 25

Appendix A Mean Changes in Performance Within Lowest and Highest Achievement Classes for White and Black Students in the Modal Grade..... 37

Appendix B Mean Changes in Performance Within Lowest and Highest Achievement Classes for All White and All Black Students..... 63

Bibliography..... 89

LIST OF TABLES AND EXHIBITS

Table 1. Distribution of Regions of the Country Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17..... 8

Table 2. Distribution of males and Females Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17..... 9

Table 3. Distribution of Racial/Ethnic Groups Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17.....10

Table 4. Distribution of Title I Eligibility Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17.....11

Table 5. Distribution of Community-Type Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17.....13

Table 6. Distribution of Size-of-Community Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17.....15

Table 7. Distribution of Percent-White Enrollment Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17.....16

Table 8. Distribution of Parental-Education Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17.....18

Table 9. Distribution of Reading-Resource Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17.....19

Exhibit 1. A Summary of Changes in Distribution Within the Lowest and Highest Achievement Classes for Selected Reporting Groups in Reading, Science and Mathematics for 9-, 13- and 17-Year-Olds..... 21

Table 10. Proportions of Racial/Ethnic Groups, by Grade, in Assessment Years..... 24

Table 11. Number of Exercises Administered in Two Assessments of Reading, Science and Mathematics..... 26

Table 12. National Mean Changes in Performance in Reading, Science and Mathematics, Within Lowest and Highest Achievement Classes for 9-, 13- and 17-Year-Olds forTwo Assessments..... 26

Table 13. National Mean Changes in Modal Grade Performance in Reading, Science and Mathematics, Within Lowest and Highest Achievement Classes for 9-, 13- and 17-Year-Olds..... 27

Exhibit 2. A Summary of Gains and Losses in Modal Grade Performance in Reading, Science and Mathematics for White and Black 9-, 13- and 17-year-Olds in Lowest Achievement Class for Selected Reporting Groups..... 29

Exhibit 3. A Summary of Gains and Losses in Modal Grade Performance in Reading, Science and Mathematics for White and Black 9-, 13- and 17-Year-Olds in Highest Achievement Class for Selected Reporting Groups..... 32

Exhibit 4. Changes in Lowest and Highest Achievement Classes in Reading, Science and Mathematics for White and Black Students in Modal Grades..... 35

Table 14. Mean Percentage Changes Between Two Assessments in Lowest and Highest Achievement Classes in Reading, Science and Mathematics for White and Black Students in Modal Grades..... 36

Table A-1. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Region..... 38

Table A-2. Mean Changes in Modal Grade Science Performance Within Lowest and Highest Achievement Classes by Race and Region..... 39

Table A-3. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Region..... 40

Table A-4. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Sex..... 41

Table A-5. Mean Changes in Modal Grade Science Performance Within Lowest and Highest Achievement Classes by Race and Sex..... 42

Table A-6. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Sex..... 43

Table A-7. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Level of Parental Education..... 44

Table A-8. Mean Changes in Modal Grade Science Performance Within Lowest and Highest Achievement Classes by Race and Level of Parental Education..... 45

Table A-9. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Level of Parental Education..... 46

Table A-10. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Type of Community..... 47

Table A-11. Mean Changes in Modal Grade Science Performance Within Lowest and Highest Achievement Classes by Race and Type of Community..... 48

Table A-12. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Type of Community..... 49

Table A-13. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Reading Resources..... 50

Table A-14. Mean Changes in Modal Grade Science Performance Within Lowest and Highest Achievement Classes by Race and Reading Resources..... 51

Table A-15. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Reading Resources..... 52

Table A-16. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Size of Community..... 53

Table A-17. Mean Changes in Modal Grade Science Performance Within Lowest and Highest Achievement Classes by Race and Size of Community..... 54

Table A-18. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Size of Community..... 55

Table A-19. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Title I Eligibility..... 56

Table A-20. Mean Changes in Modal Grade Science Performance Within Lowest and Highest Achievement Classes by Race and Title I Eligibility..... 57

Table A-21. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Title I Eligibility..... 58

Table A-22. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Percent White Enrollment..... 59

Table A-23. Mean Changes in Modal Grade Science Performance Within Lowest and Highest Achievement Classes by Race and Percent White Enrollment..... 60

Table A-24. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Percent White Enrollment..... 61

Table B-1. Mean Changes in Reading Performance Within Lowest and Highest Achievement Classes by Race and Region..... 64

Table B-2. Mean Changes in Science Performance Within Lowest and Highest Achievement Classes by Race and Region..... 65

Table B-3. Mean Changes in Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Region..... 66

Table B-4. Mean Changes in Reading Performance Within Lowest and Highest Achievement Classes by Race and Sex..... 67

Table B-5. Mean Changes in Science Performance Within Lowest and Highest Achievement Classes by Race and Sex..... 68

Table B-6. Mean Changes in Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Sex..... 69

Table B-7. Mean Changes in Reading Performance Within Lowest and Highest Achievement Classes by Race and Level of Parental Education..... 70

Table B-8. Mean Changes in Science Performance Within Lowest and Highest Achievement Classes by Race and Level of Parental Education..... 71

Table B-9. Mean Changes in Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Level of Parental Education..... 72

Table B-10. Mean Changes in Reading Performance Within Lowest and Highest Achievement Classes by Race and Type of Community..... 73

Table B-11. Mean Changes in Science Performance Within Lowest and Highest Achievement Classes by Race and Type of Community..... 74

Table B-12. Mean Changes in Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Type of Community..... 75

Table B-13. Mean Changes in Reading Performance Within Lowest and Highest Achievement Classes by Race and Reading Resources..... 76

Table B-14. Mean Changes in Science Performance Within Lowest and Highest Achievement Classes by Race and Reading Resources..... 77

Table B-15. Mean Changes in Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Reading Resources..... 78

Table B-16. Mean Changes in Reading Performance Within Lowest and Highest Achievement Classes by Race and Size of Community..... 79

Table B-17. Mean Changes in Science Performance Within Lowest and Highest Achievement Classes by Race and Size of Community..... 80

Table B-18. Mean Changes in Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Size of Community..... 81

Table B-19. Mean Changes in Reading Performance
Within Lowest and Highest Achievement Classes
by Race and Title I Eligibility..... 82

Table B-20. Mean Changes in Science Performance
Within Lowest and Highest Achievement Classes
by Race and Title I Eligibility..... 83

Table B-21. Mean Changes in Mathematics Performance
Within Lowest and Highest Achievement Classes
by Race and Title I Eligibility..... 84

Table B-22. Mean Changes in Reading Performance
Within Lowest and Highest Achievement Classes
by Race and Percent White Enrollment..... 85

Table B-23. Mean Changes in Science Performance
Within Lowest and Highest Achievement Classes
by Race and Percent White Enrollment..... 86

Table B-24. Mean Changes in Mathematics Performance
Within Lowest and Highest Achievement Classes
by Race and Percent White Enrollment..... 87

FOREWORD

When the U.S. Office of Education was chartered in 1867, one charge to its commissioners was to determine the nation's progress in education. The National Assessment of Educational Progress (NAEP) was initiated a century later to address, in a systematic way, that charge.

Since 1969, the National Assessment has gathered information about levels of educational achievement across the country and reported its findings to the nation. It has surveyed the attainments of 9-year-olds, 13-year-olds, 17-year-olds and adults in art, career and occupational development, citizenship, literature, mathematics, music, reading, science, social studies and writing. All areas have been periodically reassessed in order to detect any important changes. To date, National Assessment has interviewed and tested more than 1,000,000 young Americans.

Learning-area assessments evolve from a consensus process. Each assessment is the product of several years of work by a great many educators, scholars and lay persons from all over the nation. Initially, these people design objectives for each subject area, proposing general goals they feel Americans should be achieving in the course of their education. After careful review, these objectives are given to writers, whose task it is to create exercises (items) appropriate to the objectives.

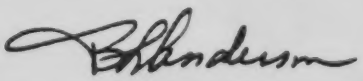
When the exercises have passed extensive reviews by subject-area specialists, measurement experts and lay persons, they are administered to probability samples. The people in these samples are selected in such a way that the results of their assessment can be generalized to an entire national population. That is, on the basis of the performance of about 2,500 9-year-olds on a given exercise, we can make generalizations about the probable performance of all 9-year-olds in the nation.

After assessment data have been collected, scored and analyzed, the National Assessment publishes reports and disseminates the results as widely as possible. Not all exercises are released for publication. Because NAEP will readminister some of the same exercises in the future to determine whether the performance levels of Americans have increased, remained stable or decreased, it is essential that they not be released in order to preserve the integrity of the study.

ACKNOWLEDGMENTS

After 13 years of data collection, the National Assessment of Educational Progress has a wealth of information with myriad possibilities for analyzing trends in students' achievement. Such trends, juxtaposed with the findings of other research and shifts in education policy and practice, can provide education policy makers and practitioners with important insights into the implications of their actions. This report, which brings together data from reading, science and mathematics assessments and focuses on differences between the performance patterns of high and low achievers in light of events during the seventies, represents another step for the National Assessment in the direction of such reporting.

The abilities and advice of many people contributed to this report. Donald Searls, Kay Barrow and Edgar Ortiz designed and conducted the analyses; Valerie Daniels and Pamela Thayer provided technical assistance; and Arthur Wise, Gloria Gilmer, Frank Rapley and Ronald Anderson provided helpful insights during the review process. Thanks are also due to John Kalk for data processing support, Rexford Brown for editorial guidance and Marci Reser for production. The report was written by Barbara J. Holmes.



Beverly Anderson
Director

CHAPTER 1

INTRODUCTION

This report presents an overview of assessment results in reading, science and mathematics for American students, ages 9, 13 and 17, during the 1970s. Although other National Assessment of Educational Progress (NAEP) publications have reported findings in these three areas, students' performance appears in a different context in this report.[1]

First, results are included in a single report for three subject areas commonly accepted as critical to the maintenance of our increasingly technological society. Second, the performance data in reading, science and mathematics have been analyzed using a variable called "achievement class," which allows insights about ranges of performance and the distribution of various groups of students within those ranges. Third, this report presents the performance data in reading, science and mathematics for students in the modal grade, the grade in which the majority of an age population is enrolled. Performance data about students in modal grades have proven useful to those who make decisions about school entry dates and student birthdates, to teachers and to those who design and implement intervention strategies to help students achieve subject-area mastery.

The primary questions this report attempts to answer are: Were the performance patterns different in reading, science and mathematics? Were the performance patterns different for low achievers and for high achievers? Were performance patterns different for students in their modal grades and students below modal grades?

---

[1]See Bibliography at end for the titles of other National Assessment reports about reading, science and mathematics.

The Data Base and the Analysis

The National Assessment conducted reading assessments in 1970-71, 1974-75 and in 1979-80; science assessments in 1969-70, 1972-73 and in 1976-77; and mathematics assessments in 1972-73, 1977-78 and 1981-82.[2] This report addresses only two assessments in each of the learning areas. The assessments are:

Science	1972-73 and 1976-77
Mathematics	1972-73 and 1977-78
Reading	1974-75 and 1979-80

The results reported here were obtained by re-administering the same sets of exercises within each subject area so that changes in distributional patterns and in performance can be observed over time. Changes in the performance of an entire age population -- all 9-year-olds for example -- are indicated by changes in the percentages of young people correctly answering a set of exercises. Changes in the performance of certain groups of students -- e.g., males or females -- are indicated by changes in the percentage of success for the group at a particular point in time and by changes in the group's position relative to the national percentage of success. By observing these two changes, one may determine, first, whether a larger or smaller proportion of students answered the exercise set correctly in one assessment than in another; and second, whether or not there has been a change between assessments in the group's standing relative to the nation as a whole. Both types of information contribute to an understanding of whether the performance level of a given group has changed.

National Assessment computes standard errors that estimate the sampling error and other random error associated with the assessment of specific exercises. NAEP adheres to the standard convention whereby differences between statistics are designated as significant only if the differences are at least twice as large as their standard errors. Differences this large would occur by chance in 5% or fewer of all possible replications of the sampling, data collection and scoring procedures for any particular age population or reporting group. Changes that are statistically significant are denoted by an asterisk (*) in the tables displaying performance and distributional data. Readers interested in additional technical details of sampling and administration are referred to the procedural handbooks which describe the processes particular to reading, science and mathematics assessments (Procedural Handbook: 1977-78 Mathematics Assessment, 1980; Procedural Handbook: 1979-80 Reading and Literature Assessment, 1981; Three Assessments of Science, 1969-77: Technical Summary, 1979).

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[2]Data for this assessment will be reported in the spring of 1983.

The Achievement-Class Variable

In 1981, the National Assessment implemented an analysis variable called "achievement class."[3] Achievement class is not one of the variables previously included in the National Assessment sample design; rather it represents a post hoc analysis based on the relative performance of students on the particular booklet of exercises with which they were assessed.

Analysis of the data by achievement class provides information about ranges of students' performance on the national assessment exercises and about the distribution of the NAEP sample within each range of achievement.

The achievement-class variable partitions the NAEP sample into four ranges: low achievers, mid-low achievers, mid-high achievers and high achievers. When the national sample is partitioned into ranges, the expected distribution of students within each range is a function of the number of ranges selected: in the case of four ranges, the expected distribution is 25%. If the observed distribution of any group of students differs significantly from 25%, then that group is under- or overrepresented within an achievement class.

As a result of partitioning the sample into achievement classes, one can observe changes in a group's representation within an achievement class and changes in a group's performance within an achievement group. Group distributions are of interest because the direction of a group's movement from one achievement class to another can be observed. Performance within achievement classes is important because the uniformity of change can be observed across achievement classes over time. For example, given an average 3% change nationally from one assessment to the next, one may observe whether or not there is a corresponding 3% change in the performance means of each achievement class. This level of information provides a somewhat more detailed view of which kinds of students -- low or high achievers -- demonstrated the most improvement or the greatest declines.

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[3]The results of the third reading assessment were analyzed using the achievement-class variable and were first published in the report, Three National Assessments of Reading: Changes in Performance, 1970-80, (1981). The science and mathematics data have now been analyzed using the achievement-class variable, and the results on the re-administered exercises are published for the first time in this report.

A benefit of the achievement-class variable is that the analysis makes explicit the fact that students of all kinds are distributed across all ranges of performance and are in both the lowest and highest achievement classes. In other words, some disadvantaged students are in the highest achievement class, a fact which is often overlooked or obscured by averaging. By the same token, some advantaged students appear in the lowest achievement group. The practical significance of achievement class lies in its ability to tell us something about what schools may be doing to help the lowest and the highest achieving students, whatever their backgrounds.

Modal Grade

All performance data obtained on the re-administered sets of exercises in reading, science and mathematics have also been analyzed in terms of students' modal grade. Modal grade refers to the grade in which most of the students of a certain age are enrolled: 4th grade is the modal grade for 9-year-olds; 8th grade, the modal grade for 13-year-olds; and 11th grade, the modal grade for 17-year-olds.

Students in modal grade are more likely to have been exposed to the same amount of curriculum than are students one grade above or below. Therefore, performance differences between groups of students who are all in the modal grade are more likely to represent real differences in learning rather than differences muddied by the fact that certain groups tend to be overrepresented below modal grade.

A more detailed discussion of modal grade appears in Chapter 3.

Organization of This Report

Chapter 2 presents the results of the distributional analyses by achievement class for the NAEP reporting categories. This information indicates the proportion of each group of students within the achievement classes; that is, 32% of the students from a particular region may be in the lowest achievement class, while 15% of the students from that region may be in the highest achievement class.

Chapter 3 presents the performance changes in reading, science and mathematics, analyzed by achievement class and modal grade. Appendix A contains tables of mean changes in performance by achievement class and by modal grade for white and black students in the National Assessment reporting categories, while Appendix B contains similar tables, but the performance changes are for ALL white and black students in the reporting categories.

CHAPTER 2

CHANGES IN PROPORTIONS OF STUDENTS WITHIN ACHIEVEMENT CLASSES

Introduction

This chapter presents an overview of distributional results for selected reporting groups. Nine categories -- comprising 27 groups -- have been selected as a means of examining the patterns of achievement for 9-, 13- and 17-year-olds in reading, science and mathematics.

The distributional data allow one to see the change in proportions of students in a group for whom a change in performance has occurred. In other words, one can observe whether or not a smaller or larger proportion of students has contributed to a change in mean performance for a group. To illustrate the usefulness of distributional data for understanding where and how much performance change occurred during the 1970s, consider that in 1971, only 5.8% of the black 9-year-olds in the National Assessment sample were in the highest achievement class. In 1975, the proportion of black 9-year-olds in the highest achievement class was 8.4%, and by 1980, the proportion had risen to 10.4%. In addition, the mean change in reading performance of black 9-year-olds was 9.9% from 1971 to 1980. So, not only did black 9-year-olds increase in reading achievement, the proportion of black 9-year-olds within the highest achievement class also increased.

However, readers should keep in mind that change in a group's performance is not necessarily related to a change in the proportion of the group's representation within an achievement class: the proportion within an achievement class may remain the same, while performance either declined or increased; or, the proportion may increase or decrease while the performance remained the same.

The first section of this chapter presents the distributional data for regions of the country, the sexes, and for racial/ethnic groups in reading, science and mathematics. They pertain to the entire sample and provide a context for the remaining reporting groups, all of which are subsumed in these three major categories.

The second section presents distributional data for groups classified on the basis of data collected from principals of participating schools. This section includes the categories of Title I eligibility, percent-white enrollment, size of community and type of community. These categories concern school and community level

information that may be of interest to legislators and administrators.

The third section presents distributional data for groups classified on the basis of background information collected from the students themselves. This section includes data about reading resources in the home and about the level of parents' education. These categories concern family level variables that are associated with achievement differences.

Definitions of the groups within each category are presented prior to a discussion of the results displayed in the tables. All of the tables in this report show only the results for the lowest achievement class (1) and for the highest achievement class (4). The numerical descriptors are used interchangeably with the words "lowest" and "highest" to bring some variety to the text.

The text highlights only changes that are statistically significant. Significant change[1] in the proportion of a group's membership in an achievement class from one assessment to the next is indicated by an asterisk (*) beside its proportion in the most recent assessment of the particular subject area.

Tables 1-9 show how the NAEP sample is distributed within the lowest (1) and highest (4) achievement classes in each of the two most recent assessments of reading, science and mathematics. Each of these tables is devoted to a single category (like region or sex) and the groups defined within that category. The percentages in the tables are proportions and should not be confused with performance data, which are discussed in the next chapter.

Data displayed in Tables 1-9 result from partitioning the sample into four ranges. The expected distribution of students within each range is 25%. If the distribution (or proportion) of a group's membership is significantly different from 25%, that group is described as under- or overrepresented within the achievement class.

A decrease in a group's proportion within the lowest achievement class (1) denotes an improvement in that group's position relative to the nation from one assessment to the next, and an increase in a group's proportion within the highest achievement class (4) also denotes an improvement from one assessment to the next. However, a decrease in a group's proportion within the lowest achievement class does not automatically result in an increase in its proportion within the highest achievement class. Instead, groups may gradually shift from low to mid-low to mid-high to the high achievement class.

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[1]Estimated standard errors for all changes reported are available from the Natioanal Assessment office, upon request.

The following text defines the selected reporting groups and presents significant highlights of the results.

Regions, Sexes, Races

Regions of the Country

The National Assessment defines four major regions of the United States as indicated on the map below: the Northeast, the Southeast, the Central and the Western regions.

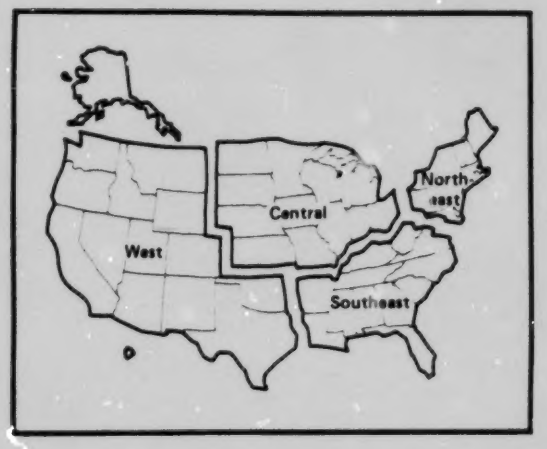

Table 1 indicates that the Northeastern and Central regions of the country have a smaller proportion of students -- at all ages and across all three subject areas -- in the lowest achievement class. They also have a larger proportion at all ages in the highest achievement class than do the Southeastern and Western regions.

More changes in proportions were observed for the Southeast than for any of the other regions. Here are some of those changes:

- The proportion of 9-year-olds in achievement class 4 in this region increased in reading and mathematics.
- The proportion of 13-year-olds in achievement class 1 in this region increased in mathematics.
- The proportion of 13- and 17-year-old students in achievement class 4 decreased in science.

- The proportion of 17-year-olds in achievement class 1 increased in science.

Other changes of significance among the regions are these:

- For the Northeast, the proportion of 17-year-olds in achievement class 4 increased in science from one assessment to the next.

- For the Central region, the proportion of 9- and 17-year-olds in achievement class 1 decreased in mathematics. Moreoever, the proportion of 17-year-olds in achievement class 4 increased in mathematics.

- For the Western region, the proportion of 9- and 17-year-olds in achievement class 1 increased in mathematics, and a corresponding decrease was noted in achievement class 4 for these two age populations.

TABLE 1. Distribution of Regions of the Country Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17#

	Achievement Class 1						Achievement Class 4					
	Reading		Science		Mathematics		Reading		Science		Mathematics	
	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment
Age 9												
Northeast	21.6%	21.2%	21.8%	20.8%	18.6%	16.6%	29.0%	28.8%	28.2%	27.8%	32.3%	32.1%
Southeast	32.0	29.6	33.8	36.1	34.7	35.5	20.0	24.6*	17.8	18.2	14.4	18.7*
Central	19.9	22.8	20.7	22.2	21.8	19.0*	28.2	25.8	27.3	27.2	28.0	29.8
West	27.9	26.0	24.5	23.2	25.8	30.1*	21.6	21.6	26.1	25.3	24.4	18.4*
Age 13												
Northeast	22.4	24.6	20.2	19.3	17.4	18.0	26.2	26.6	27.7	29.4	32.8	32.3
Southeast	32.5	31.9	31.3	33.0	34.0	37.1*	20.2	22.0	21.7	18.0*	18.2	16.4
Central	19.9	18.2	21.7	20.6	20.2	18.4	29.5	28.6	27.2	29.0	28.0	29.1
West	26.6	26.1	27.5	28.6	29.4	28.4	23.2	22.5	23.0	22.3	20.3	21.3
Age 17 (In School)												
Northeast	22.5	24.8	22.4	20.9	20.5	20.7	27.5	25.6	27.1	29.3*	30.7	31.1
Southeast	32.3	31.6	29.2	34.7*	32.1	33.6	20.4	20.9	21.6	16.2*	18.4	17.2
Central	19.8	19.8	23.4	21.8	23.0	19.1*	28.2	27.4	25.9	27.6	25.5	29.5*
West	28.1	25.2	26.3	26.1	26.3	28.9*	22.2	25.4	24.4	23.7	23.7	20.3*

#Percentages in the rows and columns should not be added.
**Asterisk indicates significant change.*

Sexes

National Assessment presents results for males and females. Table 2 indicates that at each age, in reading, females were overrepresented in achievement class 4, while males were overrepresented in achievement class 1. This pattern reversed for mathematics and science: males were clearly overrepresented in achievement class 4 and females were overrepresented in achievement class 1.

Only two significant shifts in distribution occurred for males and females.

- The proportion of 17-year-old males in the lowest achievement class increased in mathematics, while the proportion of 17-year-old females in the lowest achievement class in mathematics decreased from one assessment to the next.

TABLE 2. Distribution of Males and Females Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17#

	Achievement Class 1						Achievement Class 4					
	Reading		Science		Mathematics		Reading		Science		Mathematics	
	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment
Age 9												
Male	30.0%	29.4%	23.4%	22.7%	25.2%	26.1%	22.0%	21.9%	27.6%	28.9%	25.7%	26.0%
Female	19.9	20.6	26.6	27.4	24.8	23.9	28.0	28.1	22.4	21.0	24.3	24.1
Age 13												
Male	29.4	29.0	22.2	22.5	25.1	26.4	20.7	21.6	29.8	29.7	25.9	26.1
Female	20.6	21.2	27.7	27.5	[illegible]	23.6	29.3	28.2	20.2	20.3	24.1	23.9
Age 17 (In School)												
Male	29.8	28.8	20.4	21.1	21.8	23.6*	22.7	23.6	31.5	31.9	29.1	29.6
Female	20.4	21.1	29.3	28.8	28.0	26.3*	27.2	26.4	18.9	18.3	21.2	20.6

#Percentages in the rows and columns should not be added.
**Asterisk indicates significant change.*

Race/Ethnicity

The National Assessment presents results for whites, blacks and Hispanos. Combined results are also presented for Asian American, American Indian and Pacific Island students, classified as "Others" in the sample. Those results are pooled because they constituted only 2% of the total sample. White students were approximately 80% of the sample, black students 13% and Hispanic students approximately 5% during the assessment years for which data are reported here.

Table 3 shows that, at each age, white students tended to be underrepresented in the lowest achievement class and overrepresented in the highest achievement class in reading, science and mathematics. Conversely, black and Hispanic students tended to be overrepresented in the lowest achievement class and underrepresented in the highest achievement class at each age in all three subject areas.

Other significant changes for racialethnic groups were these:

- The proportion of black 13-year-olds in achievement class 1 decreased in reading and in science from one assessment to the next.

- But, the proportion of black 17-year-olds in achievement class 1 increased in science with a corresponding decrease in achievement class 4 from one assessment to the next.

- The proportion of white 17-year-olds in achievement class 1 decreased in science from one assessment to the next.

TABLE 3. Distribution of Racial/Ethnic Groups Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17#

	Achievement Class 1						Achievement Class 4					
	Reading		Science		Mathematics		Reading		Science		Mathematics	
	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment
Age 9												
White	19.5%	19.9%	18.4%	18.4%	18.7%	19.1%	28.8%	28.4%	29.1%	29.3%	29.0%	29.0%
Black	48.8	45.4	56.6	56.7	55.3	52.4	8.4	10.4	5.8	5.4	5.0	6.5
Hispanic†	48.0	45.3	46.9	42.5	45.0	42.1	8.8	12.2	11.2	10.1	13.1	11.5
Other	29.4	26.2	32.4	26.8	32.1	23.2	21.2	29.2	19.3	26.9	25.5	31.5
Age 13												
White	18.6	19.2	17.9	17.9	17.5	17.4	29.0	29.4	29.3	29.5	29.4	29.5
Black	56.2	49.8*	60.4	56.7*	63.2	60.6	5.9	6.7	4.6	5.2	3.5	4.2
Hispanic†	49.1	44.9	47.0	52.3	47.0	51.2	8.2	7.1	7.7	8.2	7.1	7.6
Other	28.3	38.4	48.0	36.9*	46.1	16.5*	26.4	17.9	15.4	13.5	17.4	37.1*
Age 17 (In School)												
White	18.8	18.6	20.0	18.2*	18.6	18.1	28.5	29.0	28.2	28.9	28.5	28.8
Black	61.7	61.8	54.2	64.4*	65.2	64.6	4.9	3.9	6.4	2.7*	4.0	3.6
Hispanic†	50.6	41.6	49.2	49.7	54.7	51.4			7.1	8.4	5.5	7.0
Other	39.6	32.4	43.0	37.2	39.0	21.6*	17.7	13.5	16.3	20.8	19.4	35.1*

#Percentages in the rows and columns should not be added.
†Hispanic students were included with white students in the 1970-71 assessment.
**Asterisk indicates significant change.*

Title I, Type of Community, Size of Community and Percent-White Enrollment

Title I Eligibility

Information about the eligibility of the school for Title I assistance is collected from principals of participating schools. There are two groups in this category:

Yes = Schools eligible for Title I assistance
No = Schools ineligible for Title I assistance

NAEP does not collect data indicating which students in the assessment are receiving assistance through Title I funds.

Table 4 displays the distributional data for the two groups within the Title I category. Students in Title I eligible schools (yes) tended to be overrepresented in achievement class 1 in all subject areas, at each age, and students in ineligible Title I schools tended to be overrepresented in achievement class 4 in all subject areas at each age.

Some significant changes were noted for the two groups.

- Nine-year-olds who attended Title I eligible schools increased their representation in achievement class 4 in mathematics and in science.
- However, 9- and 17-year-olds who attended schools ineligible for Title I decreased their representation in achievement class 4 in mathematics.
- The only significant change observed for 13-year-olds occurred in science for those who attended non-Title I schools: their representation increased in the lowest achievement class.

TABLE 4. Distribution of Title I Eligibility Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17#

	Achievement Class 1						Achievement Class 4					
	Reading		Science		Mathematics		Reading		Science		Mathematics	
	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment
Age 9												
Eligible: Yes	28.7%	28.8%	29.1%	28.1%	29.7%	27.4%*	22.2%	21.8%	21.3%	23.1%*	20.5%	23.0%*
Eligible: No	19.7	19.3	18.6	18.7	17.6	20.3*	29.0	29.7	30.7	28.8	32.0	29.1*
Age 13												
Eligible: Yes	28.0	28.2	27.8	27.2	28.5	28.6	22.8	22.6	23.0	23.1	22.6	21.3
Eligible: No	21.7	22.0	20.8	22.7*	19.9	21.4	27.5	27.2	28.0	26.9	28.6	28.8
Age 17 (In School)												
Eligible: Yes	27.3	25.8	27.0	27.7	28.2	25.7*	22.4	23.4	23.8	23.0	22.5	24.0
Eligible: No	23.0	24.5	22.7	23.0	21.4	24.6*	27.3	26.1	26.4	26.5	27.8	25.6*

#Percentages in the rows and columns should not be added.
**Asterisk indicates significant change.*

Type of Community

NAEP defines three "extreme" community types of special interest. About two-thirds of the respondents do not fall into the classifications reported in this category, which is defined by an occupational profile of the area served by a school as well as by the size of the community in which the school is located. The principals of participating schools provide these data. The three groups within this category are:

Rural -- Students in this group attend schools in areas with a population under 10,000. Many of the residents within these areas are farmers or farm workers.

Disadvantaged urban -- Students in this group attend schools in or around cities having a population greater than 200,000. A high proportion of the

residents in these areas are recipients of some form of public assistance and/or are not regularly employed.

Advantaged urban -- Students in this group attend schools in or around cities having a population greater than 200,000. A high proportion of the residents in these areas are in professional and/or managerial positions.

Table 5 displays the distributional data for these three groups. At each age, students who attend school in rural and in disadvantaged-urban communities were overrepresented in achievement class 1 and underrepresented in achievement class 4 in all subjects. On the other hand, students who attend school in advantaged-urban communities were underrepresented in achievement class 1 and overrepresented in achievement class 4 in all subjects.

Students in rural community schools made more significant changes than those in the other two community-type groups:

- In science, the proportions of 9-, 13- and 17-year-olds decreased in achievement class 1.
- But, the 9-year-olds increased in achievement class 4 in science.
- Thirteen-year-olds decreased in achievement class 4 in mathematics although they increased in achievement class 4 in reading.
- Seventeen-year-olds decreased in achievement class 1 in mathematics, but also decreased in achievement class 4 in reading.

Several significant changes were also observed among students who attend schools in disadvantaged-urban communities.

- The proportion of 13-year-olds in achievement class 1 decreased in reading, with an accompanying substantial increase in achievement class 4 from one assessment to the next.
- The proportion of 17-year-olds in achievement class 1 increased in science and mathematics and decreased in achievement class 4 in mathematics from one assessment to the next.

Only three significant changes were noted for students who attend school in advantaged-urban communities.

- At age 9, the proportion of students in achievement class 4 increased in science and mathematics from one assessment to the next.
- At age 17, the proportion of students in achievement class 4 increased in mathematics from one assessment to the next.

TABLE 5. Distribution of Community-Type Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17#

	Achievement Class 1						Achievement Class 4					
	Reading		Science		Mathematics		Reading		Science		Mathematics	
	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment
Age 9												
Rural	29.8%	25.1%	33.3%	20.8%*	31.4%	34.8%	22.2%	20.9%	20.0%	26.9%*	18.6%	19.0%
Disadvantaged urban	47.6	49.4	55.6	54.0	52.1	49.7	10.7	9.0	5.2	6.8	7.7	10.0
Advantaged urban	11.8	12.3	12.1	10.3	10.3	7.4	36.6	34.8	36.2	41.4*	41.2	48.1*
Age 13												
Rural	31.2	27.8	29.9	26.1*	29.7	31.9	18.8	24.5*	23.0	23.3	22.7	16.8*
Disadvantaged urban	50.2	40.5*	52.7	50.7	57.8	57.1	9.5	13.9*	8.9	8.1	6.9	9.0
Advantaged urban	10.8	10.9	11.4	11.1	7.8	10.6	38.8	42.4	34.4	37.4	40.8	42.1
Age 17 (In School)												
Rural	27.8	30.0	26.7	21.7*	29.7	26.1*	22.6	16.6*	21.6	21.3	17.8	18.5
Disadvantaged urban	44.3	43.4	44.8	54.3*	49.2	58.1*	11.9	10.5	11.3	8.6	9.9	6.6*
Advantaged urban	12.3	14.6	16.1	16.0	13.0	10.2	39.8	34.4	33.5	34.0	40.0	46.5*

#Percentages in the rows and columns should not be added.
**Asterisk indicates significant changes.*

Size of Community

Big Cities -- Students in this group attend schools within the limits of cities having a 1970 census population over 200,000.

Fringes Around Big Cities -- Students in this group attend schools that are within metropolitan areas (1970 U.S. Bureau of the Census urbanized areas) served by cities having a population greater than 200,000, but are located outside the city limits.

Medium Cities -- Students in this group attend schools in cities having a population between 25,000 and 200,000, but not classified in the "fringes" group.

Small Places -- Students in this group attend schools in communities having a population less than 25,000, but not classified in the "fringes" group.

Table 6 shows the distributional data for these groups. Students in big cities are overrepresented in the lowest achievement class and underrepresented in the highest achievement class in all subject areas.

The reverse pattern was observed for students in fringes around big cities: they are underrepresented in achievement class 1 and overrepresented in achievement class 4 in all subject areas.

Students in medium cities and in smaller places tend to cluster very near -- just a bit over or under -- the expected 25% distribution in the lowest and in the highest achievement classes. This was the case for 9-, 13- and 17-year-olds in all subject areas.

Here are the significant changes observed among students in big cities.

- The proportion of 9-year-olds in achievement class 1 decreased from the one reading assessment to the next. However, this age population experienced a decrease in achievement class 4 in science from one assessment to the next.

- The proportion of 13-year-olds in achievement class 1 decreased from one science assessment to the next, while the proportion in achievement class 4 increased.

- The proportion of 17-year-olds in achievement class 1 increased from one science assessment to the next, but their proportion in the lowest achievement class decreased in mathematics. Moreover, an increase was observed in achievement class 4 in mathematics.

Following are the changes for students in fringes around big cities. Interestingly, all changes for this group were positive ones.

- The proportion of 9-year-olds in achievement class 1 decreased, while the proportion in achievement class 4 increased from one science assessment to the next.

- The proportion of 13-year-olds in achievement class 1 decreased, while the proportion in achievement class 4 increased from one mathematics assessment to the next.

- The proportion of 17-year-olds in achievement class 1 decreased, while the proportion in achievement class 4 increased from one science assessment to the next. In addition, 17-year-olds in this group increased their representation in achievement class 4 from one mathematics assessment to the next.

These are the significant changes for students in medium cities.

- The proportion of 9-year-olds in achievement class 1 increased while their proportion in achievement class 4 decreased from one science assessment to the next.

- The proportion of 13-year-olds in achievement class 1 decreased while the proportion in achievement class 4 increased from one mathematics assessment to the next.

- The proportion of 17-year-olds in achievement class 1 decreased from one mathematics assessment to the next.

Students in smaller places also experienced some significant changes.

- The proportion of 13-year-olds in achievement class 4 decreased in science and mathematics from one assessment to the next.

- The proportion of 17-year-olds in achievement class 4 decreased in science and mathematics, while increasing in mathematics in achievement class 1.

TABLE 6. Distribution of Size-of-Community Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17#

	Achievement Class 1						Achievement Class 4					
	Reading		Science		Mathematics		Reading		Science		Mathematics	
	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment
Age 9												
Big cities	35.4%	30.0%*	33.9%	35.9%	32.3%	33.6%	18.0%	20.6%	20.0%	17.1%*	21.6%	21.1%
Fringes around big cities	18.0	21.3	18.4	15.0*	15.9	14.9	29.4	27.9	29.1	33.5*	32.4	33.4
Medium cities	25.8	26.0	20.3	28.8*	22.9	22.0	26.6	28.2	28.9	23.6*	27.2	24.5
Small places	24.2	24.6	25.3	23.9	26.6	26.7	25.0	24.5	24.2	24.8	22.3	22.9
Age 13												
Big cities	36.1	32.2	32.9	29.9*	31.5	33.5	19.6	20.3	20.0	23.3*	21.6	21.9
Fringes around big cities	17.0	20.3	21.0	19.6	19.2	16.2*	31.6	29.3	26.6	29.1	29.1	32.9*
Medium cities	28.2	26.0	24.3	23.7	23.9	15.8*	24.9	22.7	27.0	25.1	26.9	32.5*
Small places	24.3	24.3	23.9	25.5	25.5	26.7	23.4	25.3	25.7	23.9*	23.8	21.4*
Age 17 (In School)												
Big cities	35.8	31.9	33.6	38.3*	35.2	31.9*	19.1	18.6	19.6	17.8	20.6	23.8*
Fringes around big cities	19.3	21.5	23.0	18.6*	20.6	18.9	29.6	29.8	26.3	30.6*	29.1	32.3*
Medium cities	24.8	24.0	24.0	21.5	21.6	16.3*	26.9	24.9	26.0	27.6	28.8	31.3
Small places	24.5	24.4	23.1	23.6	24.8	26.8*	23.8	25.2	26.0	24.3*	22.9	20.3*

#Percentages in the rows and columns should not be added.
**Asterisk indicates significant change.*

Percent-White Enrollment

The principals of participating schools also provided information on the percent of white students in their schools. Two groups are defined within this category:

0 - 59% = Schools with a higher proportion of nonwhite students
60 - 100% = Schools with a lower proportion of nonwhite students

Table 7 displays the distributional data for this category. Schools with larger nonwhite enrollments have more students in achievement class 1 than in achievement class 4, and the opposite is the case for schools with greater white enrollments.

More changes were observed among students in schools with larger nonwhite enrollments than in schools with larger white enrollments. Changes in schools classified as 0-59% white were these:

- The proportion of 9-, 13- and 17-year-olds in achievement class 1 decreased from one reading assessment to the next.
- The proportion of 9-year-olds in achievement class 4 increased from one mathematics assessment to the next.
- In science, the proportion of 13-year-olds in achievement class 4 increased from one assessment to the next, while the proportion in achievement class 1 decreased. In addition, 13-year-olds' representation in achievement class 1 decreased from one mathematics assessment to the next.
- The proportion of 17-year-olds in achievement class 1 increased in science, while an increase for this age population was noted in achievement class 4 from one reading assessment to the next.

Only two changes were noted for the 60-100% group:

- The proportion of 13-year-olds in achievement class 1 decreased from one mathematics assessment to the next.
- The proportion of 17-year-olds in achievement class 1 decreased from one science assessment to the next.

TABLE 7. Distribution of Percent-White Enrollment Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17#

	Achievement Class 1						Achievement Class 4					
	Reading		Science		Mathematics		Reading		Science		Mathematics	
	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment
Age 9												
0-59% white enrollment	45.1%	38.8%*	48.9%	48.8%	48.0%	44.9%	11.3%	14.1%	9.8%	10.0%	8.3%	11.3%*
60-100% white enrollment	20.7	21.7	19.9	19.5	20.1	20.2	27.9	27.7	28.2	28.5	28.6	28.4
Age 13												
0-59% white enrollment	49.8	42.1*	51.0	46.0*	53.3	50.2*	10.3	12.1	10.5	13.4*	8.4	8.9
60-100% white enrollment	20.5	20.3	20.5	19.7	20.1	18.3*	27.7	28.5	27.5	27.9	27.9	29.2
Age 17 (in School)												
0-59% white enrollment	48.3	38.3*	45.5	51.3*	53.0	53.3	12.1	17.1*	10.9	9.3	10.0	8.0
60-100% white enrollment	21.1	22.5	22.2	20.7*	21.1	20.5	27.2	26.5	26.8	27.6	26.9	27.7

#Percentages in the rows and columns should not be added.
**Asterisk indicates significant change.*

Level of Parental Education and Reading Resources in the Home

Parental Education

Students participating in national assessments are asked to indicate how much schooling their mothers and fathers have completed. (Two separate questions are used: one for fathers and one for mothers.) Responses to these questions are collapsed into three groups: (1) those whose parents have not graduated from high school (NGHS), (2) those who have at least one parent who has graduated from high school (GHS) and (3) those who have at least one parent who has had some post high school education (PHS).

Table 8 shows that, at each age, students in the NGHS group were overrepresented in achievement class 1 and underrepresented in achievement class 4. The reverse of this pattern was observed for students classified in the PHS group. These distributional patterns held for these two groups in reading, science and mathematics.

On the other hand, a pattern was not easily discerned for students classified in the GHS group. At age 9, this group was slightly underrepresented in achievement class 1 in all three subjects. However, the 13-year-olds were closer to the 25% expected distribution or above it in achievement class 1 in all subjects. By age 17, this group of students was slightly overrepresented in achievement class 1 and underrepresented in achievement class 4.

More changes in proportions were noted among students in the NGHS group than among the GHS or the PHS group. At age 9, the proportion of NGHS students in achievement class 1 in mathematics increased, while it decreased in achievement class 4 in mathematics and science. At age 13, the NGHS group increased in achievement class 1 in science and, by age 17, increased in achievement class 1 in science and mathematics.

Other significant changes in distribution within the parental-education category were these:

- The proportion of 9-year-olds in the GHS group increased in achievement class 1 in reading from one assessment to the next.
- The proportion of 13-year-olds in the GHS group decreased in achievement class 4 in science from one assessment to the next.
- The proportion of 17-year-olds in the GHS group increased in achievement class 1 in mathematics and decreased in achievement class 4 from one assessment to the next.
- The proportion of 13-year-olds in the PHS group increased in achievement class 1 in reading from one assessment to the next.

- The proportion of 17-year-olds in the PHS group decreased in achievement class 1 in science from one assessment to the next.

TABLE 8 Distribution of Parental-Education Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17#

	Achievement Class 1						Achievement Class 4					
	Reading		Science		Mathematics		Reading		Science		Mathematics	
	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment
Age 9												
Not graduated high school	39.9%	42.7%	36.4%	38.5%	36.2%	42.3%*	13.7%	15.3%	16.2%	11.6%*	15.8%	10.7%*
Graduated high school	22.6	26.2*	20.6	20.3	21.4	24.0	25.0	22.8	25.1	26.5	25.2	24.2
Post high school	17.0	17.4	14.9	15.0	15.4	14.6	34.3	33.2	36.7	36.8	36.5	38.2
Age 13												
Not graduated high school	41.2	40.8	37.6	42.1*	40.7	41.9	12.2	9.8	12.7	11.0	11.2	9.7
Graduated high school	24.6	26.9	23.6	23.8	23.5	23.1	21.3	19.9	23.0	20.1*	22.5	21.1
Post high school	12.9	15.7*	14.3	13.8	12.5	12.6	37.6	35.4	36.3	37.6	37.5	38.9
Age 17 (In School)												
Not graduated high school	42.1	42.2	38.6	43.4*	42.7	46.7*	10.7	10.2	13.0	10.8	9.8	7.6
Graduated high school	27.2	30.0	26.6	27.3	26.4	29.0*	20.4	18.8	21.1	19.7	20.0	18.0*
Post high school	14.4	15.5	16.4	14.7*	14.0	13.8	34.9	33.6	33.6	34.8	35.8	36.2

#Percentages in the rows and columns should not be added.
**Asterisk indicates significant change.*

Reading Resources in the Home

One of the background questions students respond to concerns access to a variety of articles in their home environments. The availability of reading resources -- newspapers, magazines, a dictionary and an encyclopedia -- is one home environment aspect summarized. Students' responses to the reading-resources question are collapsed into the following three groupings:

<3 = Fewer than 3 of the above reading resources in the home
3 = Exactly 3 of the above reading resources in the home
4 = Exactly 4 of the above reading resources in the home

Table 9 shows the distributional data for these groups. As might be expected, students with access to four types of home reading resources tended to be underrepresented in achievement class 1 and overrepresented in achievement class 4. The reverse of this pattern was observed for students having fewer than three types of reading resources in the home.

However, more changes were observed among students having fewer than three types of reading resources in the home than for the other two groups in this category.

- The proportion of 13-year-olds in achievement class 1 decreased from one mathematics assessment to the next.

- The proportion of 17-year-olds in achievement class 1 increased from one science assessment to the next, but decreased from one mathematics assessment to the next.

- The proportion of 17-year-olds in achievement class 4 decreased in science from one assessment to the next, but increased in achievement class 4 from one mathematics assessment to the next.

Other significant changes within the reading-resources category were these:

- Among students with exactly three types of reading resources, the proportions of 13- and 17-year-olds in achievement class 4 increased from one mathematics assessment to the next.

- Also, the proportion of 17-year-olds in the "3 exactly" group in achievement class 1 decreased from one mathematics assessment to the next. This age population experienced an increase in achievement class 4 in reading and in mathematics.

Only two changes were noted among students having access to four types of reading resources in the home.

- The proportion of 13-year-olds in achievement class 1 increased from one mathematics assessment to the next.

- The proportion of 17-year-olds in achievement class 1 decreased from one science assessment to the next.

TABLE 9. Distribution of Reading-Resource Categories Within Lowest and Highest Achievement Classes in Reading, Science and Mathematics Assessments, Ages 9, 13 and 17#

	Achievement Class 1						Achievement Class 4					
	Reading		Science		Mathematics		Reading		Science		Mathematics	
	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment	2nd Assessment	3rd Assessment	2nd Assessment	3rd Assessment	1st Assessment	2nd Assessment
Age 9												
Less than 3 types	38.6%	40.1%	40.7%	38.5%	41.1%	42.4%	13.7%	14.4%	13.8%	14.4%	12.1%	10.7%
3 types	22.2	22.5	22.1	21.7	21.3	22.3	25.6	25.2	23.6	24.4	25.0	25.1
4 types	13.9	14.6	13.1	13.0	13.6	12.5	36.2	33.9	37.1	38.2	37.2	37.2
Age 13												
Less than 3 types	49.6	46.2	48.4	47.3	52.1	47.0*	9.0	9.6	9.9	9.8	8.2	8.9
3 types	30.3	29.8	29.2	28.5	29.6	27.5	17.9	19.3	19.2	18.7	17.8	20.2*
4 types	14.2	15.6	15.0	14.9	13.5	16.0*	34.0	33.0	33.0	34.0	34.2	33.1
Age 17 (In School)												
Less than 3 types	56.5	47.8	44.5	52.4*	51.8	42.3*	8.3	9.4	11.7	7.7*	8.4	14.2*
3 types	32.2	29.6	31.3	32.8	34.5	28.6*	17.1	20.5*	18.0	18.2	16.1	19.6*
4 types	17.4	17.6	19.7	17.1*	17.5	16.9	31.0	30.7	29.5	30.7	30.6	31.2

#Percentages in the rows and columns should not be added.
**Asterisk indicates significant change.*

Summary

Exhibit 1 summarizes changes in distributions within the lowest and highest achievement classes for the selected reporting groups in reading, science and mathematics for 9-, 13- and 17-year-olds. The equal sign (=) indicates no significant change in proportional representation from one assessment to the next. The plus sign (+) indicates significant improvement in status from one assessment to the next, while the minus sign (-) indicates significant deterioration in status from one assessment to the next.

A review of Exhibit 1 shows that in achievement class 1, more group changes occurred in mathematics than in science or reading. Of these, most were for the 17-year-olds. Groups of 17-year-olds in achievement class 1 whose status improved were:

- Those who reside in the Central region of the country
- Those in Title I eligible schools
- Those who live in big cities
- Those who attend school in rural communities
- Those who had access to fewer than three or exactly three types of reading resources in the home

In achievement class 4, more increases in proportional representation also occurred in mathematics, as opposed to science or reading. Again, more groups at age 17 showed an improved status than did groups of 9- or 13-year-olds. Also, some of the same groups of 17-year-olds whose status improved in achievement class 1 also showed improved status in achievement class 4. For example:

- Those who reside in the Central region of the country
- Those who live in big cities
- Those who have access to fewer than three or exactly three types of reading resources in the home

Also, the status of these groups of 17-year-olds improved in achievement class 4:

- Those who attend school in advantaged-urban communities
- Those who live in fringes around big cities

EXHIBIT 1. A Summary of Changes in Distributions Within the Lowest and Highest [illegible]ment Classes for Selected Reporting Groups in Reading, Science and Mathematics for 9-, 13- and 17-Year-Olds

	Achievement Class 1									Achievement Class 4								
	Reading			Science			Mathematics			Reading			Science			Mathematics		
	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17
Region																		
Northeast	=	=	=	=	=	=	=	=	=	=	=	=	=	=	+	=	=	=
Southeast	=	=	=	=	=	-	=	-	=	+	=	=	=	-	-	+	=	=
Central	=	=	=	=	=	=	+	=	+	=	=	=	=	=	=	=	=	+
West	=	=	=	=	=	=	-	=	-	=	=	=	=	=	=	-	=	-
Sex																		
Male	=	=	=	=	=	=	=	=	-	=	=	=	=	=	=	=	=	=
Female	=	=	=	=	=	=	=	=	+	=	=	=	=	=	=	=	=	=
Race/ethnicity																		
White	=	=	=	=	=	+	=	=	=	=	=	=	=	=	=	=	=	=
Black	=	+	=	=	+	-	=	=	=	=	=	=	=	=	-	=	=	=
Hispano	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Others	=	=	=	=	+	=	=	+	+	=	=	=	=	=	=	=	+	+
Title I eligibility																		
Yes	=	=	=	=	=	=	+	=	+	=	=	=	+	=	=	=	=	=
No	=	=	=	=	-	=	-	=	-	=	=	=	=	=	=	-	=	-
Type of community																		
Rural	=	=	=	+	+	+	=	=	+	=	+	-	+	=	=	=	-	=
Disadvantaged urban	=	+	=	=	=	-	=	=	-	=	+	=	=	=	=	=	=	-
Advantaged urban	=	=	=	=	=	=	=	=	=	=	=	=	+	=	=	+	=	+
Size of community																		
Big cities	+	=	=	=	+	-	=	=	+	=	=	=	-	+	=	=	=	+
Fringes around big cities	=	=	=	+	=	+	=	+	=	=	=	=	+	=	+	=	+	+
Medium cities	=	=	=	-	=	=	=	+	+	=	=	=	-	=	=	=	+	=
Small places	=	=	=	=	=	=	=	=	-	=	=	=	=	-	-	=	-	-
Percent white enrollment																		
0-59% white school	+	+	+	=	+	-	=	+	=	=	=	+	=	+	=	+	=	=
60-100% white school	=	=	=	=	=	+	=	+	=	=	=	=	=	=	=	=	=	=
Parental education																		
Not graduated high school	=	=	=	=	-	-	-	=	-	=	=	=	-	=	=	-	=	=
Graduated high school	-	=	=	=	=	=	=	=	-	=	=	=	=	-	=	=	=	-
Post high school	=	-	=	=	=	+	=	=	=	=	=	=	=	=	=	=	=	=
Reading resources																		
3 categories	=	=	=	=	=	-	=	+	+	=	=	=	=	=	-	=	=	+
3 categories	=	=	=	=	=	=	=	=	+	=	=	+	=	=	=	=	+	+
4 categories	=	=	=	=	=	+	=	-	+	=	=	=	=	=	=	=	=	=

Legend: = = no significant change in proportional representation since previous assessment.
+ = significant improvement in status relative to proportional representation since previous assessment.
- = significant deterioration in status relative to proportional representation since previous assessment.

The fewest changes, across all three subject areas, occurred in reading and these, too, tended to be more positive than negative whether they were in the lowest or highest achievement classes. For instance, six groups experienced improved status in the lowest achievement class and five groups experienced an increase in proportional representation in the highest achievement class, which meant improved status also. Three of these changes occurred for 13-year-olds: blacks, students in disadvantaged-urban schools and those who attend schools having 0-59% white enrollment. Thirteen-year-olds in disadvantaged-urban schools improved their status in achievement class 4 in reading.

Also in reading, at each age, students who attend schools with 0-59% white enrollment decreased in the lowest achievement class. At age 17, students in this group had an increase in achievement class 4.

Groups that experienced positive changes in reading in the lowest achievement class often were not the same as those that experienced positive changes in the highest achievement class. This pattern is dissimilar to that for mathematics.

In science, the lowest achievement class was the site for more changes (20) than was the highest achievement class (18). However, these changes are very similar and appear to balance (or cancel) one another. In the lowest achievement class, there were 11 groups whose proportional representation decreased, while 8 groups increased in the highest achievement class, but the groups often were not the same. The picture for science as a whole is not as clear as that for mathematics or for reading.

Nevertheless, some groups experienced a decrease in proportional representation in achievement class 1, and an increase in achievement class 4. These were:

- Nine-year-olds who attend school in rural communities
- Thirteen-year-olds who attend school with 0-59% white enrollment
- Seventeen-year-olds who live in fringes around big cities

Clear patterns were not discernible for the remaining groups in science.

CHAPTER 3

PERFORMANCE CHANGES IN READING, SCIENCE AND MATHEMATICS FOR 9-, 13- AND 17-YEAR-OLDS

Introduction

This chapter presents an overview of performance changes in reading, science and mathematics for 9-, 13- and 17-year-olds in their respective modal grades. Readers will recall from the Introduction (Chapter 1) that modal grade is the grade in which the majority of students of a particular age are enrolled. The modal grade for 9-year-olds is grade 4; for 13-year-olds, grade 8; and for 17-year-olds, grade 11.

Performance data for students in modal grades are interesting because observed differences in performance between groups of students, all of whom are in modal grade, are more likely real, as opposed to differences due to differing proportions in the modal grade. For example, a 9-year-old in grade 3 is expected to perform differently than a 9-year-old in grade 4. But, when two 9-year-olds who are in the fourth grade perform differently, results are more likely indicative of a real difference in the amount learned as both students would be more likely to have received equivalent amounts of instruction in various subjects.

Modal grade data are especially useful when juxtaposed with national level data for age populations and for the selected reporting groups within them. For example, national data indicate that certain groups of students (Hispanos, blacks, those who attend school in disadvantaged-urban communities, and several others) tend to perform at levels below that of the nation in reading, science and mathematics. However, it is also the case that a disproportionate number of these students are found below modal grade. In 1980, 34% of the black 9-year-olds were below modal grade compared with 27% of the whites. At age 13, 36% of the blacks were below modal grade compared with 28% of the whites, and at age 17, 29% of the blacks were below modal grade compared with 11% of the whites (see Table 10).

TABLE 10. Proportions of Racial/Ethnic Groups, by Grade, in Assessment Years

	White					Black					Hispanic					Other##				
Age 9																				
	<3rd	3rd	4th	>4th	Other	<3rd	3rd	4th	>4th	Other	<3rd	3rd	4th	>4th	Other	<3rd	3rd	4th	>4th	Other
1972-73 science and mathematics	0.7	23.3	75.1	0.5	0.4	1.1	24.1	72.1	0.9	1.8	2.2	29.3	68.0	0.4	0.0	6.5	21.1	71.1	1.0	0.2
1974-75 reading	0.6	21.5	76.1	0.5	1.3	1.0	22.5	72.6	0.9	2.9	2.4	28.8	68.4	0.3	0.1	1.7	20.5	76.0	1.1	0.8
1976-77 science	0.6	23.1	75.4	0.6	0.3	0.9	21.9	74.4	1.2	1.6	1.5	34.1	64.0	0.4	0.0	1.3	19.3	77.5	2.0	0.0
1977-78 mathematics	0.7	25.1	73.1	0.6	0.6	1.5	25.0	68.5	1.9	3.0	1.8	29.9	67.2	0.7	0.4	0.7	20.3	74.6	2.2	2.2
1979-80 reading	0.9	25.8	72.9	0.3	0.0	2.6	31.5	62.6	0.5	2.9	2.5	39.9	54.6	0.1	3.0	0.0	25.3	71.6	3.1	0.0
Age 13																				
	<7th	7th	8th	>8th	Other	<7th	7th	8th	>8th	Other	<7th	7th	8th	>8th	Other	<7th	7th	8th	>8th	Other
1972-73 science and mathematics	2.0	23.1	73.7	1.1	0.1	5.3	31.6	61.5	1.0	0.6	5.7	39.3	54.4	0.5	0.0	12.2	31.2	56.2	0.4	0.0
1974-75 reading	1.6	24.0	73.7	0.8	0.0	4.6	29.7	64.4	1.3	0.0	9.0	36.5	53.1	1.4	0.0	1.6	17.2	79.4	1.9	0.0
1976-77 science	1.6	23.8	73.4	1.1	0.1	2.6	29.1	66.5	1.7	0.0	6.5	36.2	56.5	0.4	0.4	3.2	32.6	63.6	0.5	0.0
1977-78 mathematics	1.1	25.1	73.3	0.5	0.0	4.5	30.8	59.6	0.6	4.5#	2.9	35.9	60.7	0.5	0.0	0.0	25.8	69.6	4.7	0.0
1979-80 reading	1.3	26.6	70.9	0.5	0.7	3.6	31.9	60.4	1.2	3.0	4.1	27.2	57.2	1.7	9.8#	0.0	27.0	71.8	1.1	0.0
Age 17																				
	<10th	10th	11th	>12th	Other	<10th	10th	11th	>12th	Other	<10th	10th	11th	>12th	Other	<10th	10th	11th	>12th	Other
1972-73 science and mathematics	1.2	10.0	75.2	13.5	0.0	6.2	22.3	59.3	12.3	0.0	10.9	27.7	54.8	6.6	0.0	6.6	23.9	56.8	12.6	0.0
1974-75 reading	0.8	11.6	75.6	11.7	0.3	4.9	22.3	60.3	12.1	0.4	3.2	35.5	53.9	5.9	1.5	3.1	17.3	63.0	16.5	0.0
1976-77 science	0.8	10.6	78.0	10.6	0.0	4.3	22.4	63.2	10.1	0.0	5.0	27.5	58.9	8.6	0.0	3.3	19.2	65.9	11.6	0.0
1977-78 mathematics	0.7	11.5	78.0	9.8	0.0	5.1	22.4	62.2	10.2	0.2	2.0	27.1	61.5	9.4	0.0	3.9	13.7	67.1	15.3	0.0
1979-80 reading	1.0	10.3	79.7	9.0	0.0	6.3	22.3	62.9	8.3	0.2	5.0	21.6	64.3	9.1	0.0	0.0	20.4	69.1	10.5	0.0

#The percentages for this age group for this year are questionable, due to possible coding errors. The figures presented here represent our best estimate of the actual percentages of students sampled from the various grade categories for age 13.
##This ethnic category includes American Indians, Asian Americans, Pacific Islanders and any others not included in the major categories.

* * * * * * *

The results that form the basis for the remainder of this chapter are displayed on tables in Appendix A. Because the number of tables required to adequately display the data is so large, they are not included in the text. Rather, the text contains two exhibits (2 and 3) that summarize the tables in Appendix A, but without the actual percentage figures. Readers interested in the percentages should refer to the appendix.

A brief description of the tables in Appendix A is indicated, however. The tables present mean changes in modal grade performance within the lowest and highest achievement classes for white and black students at ages 9, 13 and 17. Each table displays the data for a selected reporting category: for example, white and black students in achievement class 1 and in achievement class 4 by regions of the country.

Data are provided for all white and all black students in Appendix B.

The tables in the appendixes are ordered to facilitate their utility for making comparisons across the three subject areas for the selected reporting categories. Tables are arranged in the same order as that used in the preceding chapter, and the performance data for each reporting category are arranged by reading first, science second and mathematics last. Therefore, Tables A-1, A-2 and A-3 are for regions of the country in reading, science and mathematics; Tables A-4, A-5 and A-6 are for the sexes in reading, science and mathematics, and so on.

Changes in Performance

Performance data presented in this report are based on results obtained from the administration of the same exercise sets in two assessments of reading, science and mathematics to the 9-, 13- and 17-year-olds. Each of these age populations was administered exercises appropriate to it.

Table 11 shows the number of exercises re-administered to each age population in reading, science and mathematics.

Table 12 shows the national mean changes in performance for reading, science and mathematics within the lowest and highest achievement classes.

TABLE 11. Number of Exercises Administered in Two Assessments of Reading, Science and Mathematics

	Age 9	Age 13	Age 17
Reading	58	71	71
Science	69	75	70
Mathematics	55	77	102

TABLE 12. National Mean Changes in Performance in Reading, Science and Mathematics, Within Lowest and Highest Achievement Classes for 9-, 13- and 17-Year-Olds for Two Assessments

	Age 9		Age 13		Age 17	
	Class 1	Class 4	Class 1	Class 4	Class 1	Class 4
Reading	5.0%*	1.4%*	1.4%*	0.3%	-1.0%	-0.4%
Science	1.0	-2.5*	1.5*	-2.5*	0.6	-3.9*
Mathematics	1.1	-3.0*	1.2	-3.4*	-1.2	-4.3*

*Asterisk indicates significant change in performance between assessments.

At the national level, a greater gain occurred in achievement class 1 for 9-year-olds in reading than for any other age population or in any other subject area. Nine-year-olds in achievement class 4 also gained in reading performance. Although 9-year-olds in achievement class 1 did not lose ground in science and mathematics, those in achievement class 4 suffered fairly substantial losses in these two subject areas.

Thirteen-year-olds in achievement class 1 gained in reading and in science and remained stable in mathematics. However, like 9-year-olds, 13-year-olds in achievement class 4 lost ground in science and mathematics.

Seventeen-year-olds in achievement class 1 demonstrated stability in reading, science and mathematics, but their peers in achievement class 4 sustained large losses in science and mathematics.

Nationally, then, mathematics and science appeared to be the subject areas in which the performance of American youth declined during the 1970s. On balance, the reading performance of most American students remained fairly stable across ages, with some notable gains among younger students.

Now let's examine the changes for students in the modal grades. Table 13 shows the national mean changes for students in the modal grades in reading, science and mathematics, within the lowest and highest achievement classes. In the lowest achievement class, 9-year-olds made significant gains in reading and in science, whereas 9-year-olds as a whole showed a gain in reading only. Thirteen-year-olds, too, gained in reading and in science, and this pattern did not differ from that for 13-year-olds as a whole. Like 17-year-olds as a whole, those in modal grade showed no significant change in reading, science or mathematics.

In the highest achievement class, 9-year-olds in the 4th grade experienced a significant gain in reading, but declined significantly in science and mathematics. This pattern pertained also to 9-year-olds as a whole. Like the total 13- and 17-year-old populations, those in 8th and 11th grades declined significantly in science and mathematics.

TABLE 13. National Mean Changes in Modal Grade Performance in Reading, Science and Mathematics, Within Lowest and Highest Achievement Classes for 9-, 13- and 17-Year-Olds

	Age 9		Age 13		Age 17	
	Class 1	Class 4	Class 1	Class 4	Class 1	Class 4
Reading	6.1%*	1.4%*	1.7%*	0.4%	-1.0%	-0.5%
Science	1.4*	-2.4*	1.7*	-2.5*	0.4	-4.2*
Mathematics	0.4	-3.1*	1.1	-3.4*	-1.6	-4.3*

*Asterisk indicates significant change in performance between assessments.

The similarity of the modal grade changes (Table 13) to the overall age changes (Table 12) tells us that the declines in the highest achievement class were not caused only by students below modal grade; nor were the increases for the low achievers caused only by improvements among students below modal grade. Both the improvements and the declines are also taking place within the modal grade.

Now let's compare changes in the lowest achievement class for groups of white and black youngsters in the modal grades.

Performance Changes in the Lowest Achievement Class

Exhibit 2 displays a summary of the gains (+ sign) and losses (- sign) in modal grade performance in reading, science and mathematics for white and black students in the lowest achievement class. The summary includes all three age populations. (Readers will recall that Exhibits 2 and 3 summarize the total number of tables in Appendix A.)

Exhibit 2 shows that for white 4th, 8th and 11th graders in the lowest quartile (class 1), the pattern of gains and losses shifted for certain groups of students. Readers should keep in mind the fact that the population groups are not discrete. A given student may be in many groups at the same time, e.g., white, Northeastern, male, disadvantaged-urban community, etc. The reason for examining patterns across groups is to see how pervasive a change has been socially -- that is, how many different kinds of students and schools contributed to the achievement ups and downs.

Reading

- More gains occurred in reading than in science or in mathematics, and most of these gains were among groups of fourth graders.
- Eighth graders, too, had some gains in reading: for example, students in the Southeastern and Western regions gained and so did those who attend school in disadvantaged-urban communities.
- Some losses occurred among the groups of 11th graders: for example, among males and for students in the Northeastern and Central regions of the country.

Science

- Overall, white students in their modal grades demonstrated a lot of stability and more gains than losses in science at each age. Stability was particularly evident among the 11th graders, and the gains occurred for 4th graders.
- The only loss for white students in the modal grade and in the lowest quartile of performance occurred for 11th graders who attend school in rural communities.

Mathematics

- Gains in performance occurred for fourth graders in the Northeast, those who attend schools in both disadvantaged- and advantaged-urban communities and for those who live in medium-sized cities. Among this latter group, gains were also observed for the eighth graders.

EXHIBIT 2. A Summary of Gains and Losses in Mortal Grade Performance in Reading, Science and Mathematics for White and Black 9-, 13- and 17-Year-Olds in Lowest Achievement Class for Selected Reporting Groups

	White									Black								
	Reading			Science			Mathematics			Reading			Science			Mathematics		
	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17
Region																		
Northeast	+	=	-	+	=	=	+	=	-	+	+	+	=	=	-	+	=	+
Southeast	+	+	=	=	+	+	=	=	-	+	+	+	=	=	=	+	=	=
Central	+	=	-	=	=	=	=	=	=	+	+	-	-	-	=	+	=	-
West	+	+	=	=	+	=	=	=	-	+	+	=	+	=	=	+	=	=
Sex																		
Male	+	=	-	=	+	=	=	=	=	+	+	+	-	=	=	+	+	=
Female	+	=	=	+	=	=	=	=	-	+	+	=	=	+	=	+	+	+
Title I																		
Yes	+	=	-	+	+	=	=	=	=	+	+	+	=	+	=	+	+	+
No	+	=	-	=	+	=	=	=	-	+	+	=	+	=	=	+	+	=
Type of community																		
Rural	+	=	=	+	+	-	-	=	=	+	=	+	+	=	+	+	=	-
Disadvantaged urban	+	+	-	=	=	=	+	=	-	+	+	=	=	+	=	+	=	+
Advantaged urban	+	=	=	+	+	=	+	=	=	+	-	=	=	+	+	+	Undefined	=
Size of community																		
Big cities	+	+	=	=	=	+	-	=	=	+	+	=	=	+	=	+	=	+
Fringes around big cities	+	+	=	+	+	=	=	=	-	+	=	=	=	+	+	+	+	=
Medium cities	+	=	=	+	+	=	+	+	-	+	+	+	=	=	-	+	+	+
Smaller places	+	=	-	+	+	=	=	=	=	+	+	=	-	=	=	+	=	=
Percent white enrollment																		
0-59% white school	+	=	-	+	=	+	=	=	-	+	+	=	=	=	=	+	+	+
60-100% white school	+	=	-	=	+	=	=	=	-	+	+	+	=	+	=	+	=	+
Parental education																		
Not graduated high school	+	=	-	=	+	+	=	=	-	+	+	=	-	+	-	+	+	=
Graduated high school	+	=	-	+	+	=	=	=	-	+	=	=	=	=	=	+	+	+
Post high school	+	=	-	=	=	=	=	=	-	+	+	=	=	=	+	+	+	+
Reading resources																		
< 3 categories	+	+	=	+	+	=	=	=	=	+	+	=	=	=	-	+	+	+
3 categories	+	=	=	=	+	=	=	=	=	+	=	+	-	=	=	+	=	+
4 categories	+	=	-	+	+	=	=	=	-	+	+	+	=	+	+	+	=	+

Legend

+ = significant gain
− = significant loss
= = no significant change

- More losses in mathematical performance occurred for whites in the 11th grade than for the younger students in their respective modal grades. For example, 11th graders in the Northeastern, Southeastern and Western regions of the country experienced a loss, with only those in the Central region showing stability. Females in the 11th grade and those who attend school in disadvantaged-urban communities also experienced a loss in mathematical performance.

By contrast, Exhibit 2 indicates the following pattern of gains and losses for groups of black students, also at ages 9, 13 and 17 and in the modal grades.

Reading

- All groups gained at the fourth-grade level, and most groups gained in reading also at the eighth-grade level. Only black eighth graders who attend school in advantaged-urban communities experienced a decline in reading performance.

- Gains occurred also for certain groups of black students in the 11th grade: for example, students in the Northeast and Southeast and males and students who attend schools in rural communities.

- Only one group of 11th graders experienced a decline: those in the Central region.

Science

- Overall, the science performance of black students at each age and in their modal grades was characterized by more stability and gain than by losses. This pattern seemed to have pertained for most of the reporting categories.

- As a whole, 13-year-olds in the eighth grade gained more than did 9- or 17-year-olds in their respective modal grades. For example, 13-year-old females, students who attend school in advantaged- and disadvantaged-urban communities and students who reside in the Northeast and the Southeast gained in science performance.

- Seventeen-year-olds in the 11th grade in the Northeast lost ground in science as did those who live in medium-sized cities.

- Fourth and eighth graders in the Central region also lost ground in science.

Mathematics

- Overall, more gain and stability than loss was observed in mathematics performance at each age for black youngsters in the modal grades.
- Only 11th graders in the Central region and those who attend school in rural communities lost in mathematics performance.
- All remaining groups, at each age, either made a positive change or demonstrated stability in performance.

Performance Changes in the Highest Achievement Class

Corresponding to Exhibit 2 (but for the highest quartile [class 4]), Exhibit 3 indicates a difference between the performance patterns of white and black students, at ages 9, 13 and 17 who are in their modal grades. Here is an overview of patterns in reading, science and mathematics for white students in the highest quartile.

Reading

- As was the case with white students in the lowest quartile, reading performance of white students in the highest quartile fared better than did science or mathematics performance.
- Overall, there were few changes in reading performance -- especially among the teenagers in the 8th and 11th grades. Most changes occurred for 4th graders and these changes were positive. For example, gains were observed for students in the Southeast, for males, for students in advantaged-urban community schools and several other categories as well.
- No losses occurred in reading performance of the highest quartile for either age population.

Science

- Overall, science performance was marked by losses at each age in the highest quartile, across the majority of reporting categories.
- One exception to the overall pattern of loss was observed among fourth graders who attend Title I eligible schools: this group gained in science performance.

EXHIBIT 3. A Summary of Gains and Losses in Model Grade Performance in Reading, Science and Mathematics for White and Black 9-, 13- and 17-Year-Olds in Highest Achievement Class for Selected Reporting Groups

	White									Black								
	Reading			Science			Mathematics			Reading			Science			Mathematics		
	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17
Region																		
Northeast	=	=	=	-	-	-	-	-	-	+	+	-	+	=	-	+	=	-
Southeast	+	=	=	-	-	-	-	=	-	+	+	-	=	-	=	+	-	-
Central	=	=	=	-	-	-	-	-	-	+	=	=	=	-	-	+	-	-
West	+	=	=	-	-	-	-	-	-	+	+	-	=	-	-	+	=	-
Sex																		
Male	+	=	=	-	-	-	-	-	-	+	+	=	=	=	-	+	-	-
Female	=	=	=	-	-	-	-	-	-	+	+	-	=	-	-	+	-	-
Title I																		
Yes	=	=	=	+	-	-	-	-	-	+	+	=	=	-	-	+	-	-
No	+	=	=	-	-	-	-	-	-	+	+	-	=	=	-	+	-	-
Type of community																		
Rural	=	=	=	-	-	-	-	-	-	+	+	-	=	-	=	=	+	=
Disadvantaged urban	=	+	=	-	-	=	=	-	-	+	+	=	+	-	-	+	-	-
Advantaged urban	+	=	=	-	-	-	-	-	-	=	=	-	+	+	-	=	=	=
Size of community																		
Big cities	+	=	=	-	-	-	-	-	-	+	+	-	=	=	-	+	-	-
Fringes around big cities	=	=	=	-	-	-	-	-	-	+	+	=	+	=	=	+	+	-
Medium cities	=	=	=	-	=	-	-	-	-	+	=	-	+	-	=	+	-	=
Smaller places	=	=	=	-	-	-	-	-	-	+	+	-	=	=	-	+	-	-
Percent white enrollment																		
0-59% white school	=	=	=	-	=	-	-	-	-	+	+	=	+	-	-	+	-	-
60-100% white school	+	=	=	-	-	-	-	-	-	+	+	-	=	=	-	+	-	-
Parental education																		
Not graduated high school	=	+	=	=	-	=	+	-	-	=	+	=	-	=	-	+	-	-
Graduated high school	+	=	=	-	-	-	-	-	-	+	+	-	=	-	-	+	-	-
Post high school	=	=	=	-	-	-	-	-	-	+	+	-	=	=	-	+	-	-
Reading resources																		
< 3 categories	=	=	=	-	-	-	-	-	-	+	=	=	=	-	-	+	-	-
3 categories	+	=	=	-	-	-	-	-	-	+	+	=	=	-	-	+	-	-
4 categories	=	=	=	-	-	-	-	-	-	+	+	-	+	=	-	+	=	=

Legend

+ = significant gain
- = significant loss
= = no significant change

Mathematics

- Overall, mathematics performance was marked by more losses than science. This pattern pertained across the three age populations of white students and across the majority of reporting categories.

- The only gain realized in mathematics was for fourth graders whose parents have not graduated from high school.

- Only two groups -- fourth graders who attend school in disadvantaged-urban communities and eighth graders in the Southeast -- remained stable.

- All other groups, at each age, showed losses in mathematics performance.

By contrast, Exhibit 3 shows the following patterns of gains and losses for groups of black students, also at ages 9, 13 and 17 and in the modal grades.

Reading

- Most groups of black 4th and 8th graders made gains in reading performance. Among black 11th graders, performance either remained the same or declined in reading, with about an even split between stability and loss.

Science

- Several groups of black fourth graders experienced gains in science performance: for example, students in the Northeast, those who attend school in disadvantaged- and advantaged-urban communities, those who live in fringes around big cities and in medium-sized cities.

- Most groups of black eighth graders declined or remained stable in science performance. However, those who attend school in advantaged-urban communities gained in performance.

- Losses in science performance were concentrated among various groups of blacks at age 17 and in the 11th grade.

- A concentration of losses in science performance occurred at age 17, among the 11th graders, rather than among the younger students in the 4th and 8th grades. However, the performance of four groups of 17-year-old blacks remained stable: students in the Southeast, those who attend school in rural communities and those who live in fringes around big cities and in medium-sized cities.

Mathematics

- Overall, the pattern for mathematics is similar to that of science: gains for the younger black students, with losses concentrated among the 11th graders, but some stability also observed for the 8th and 11th graders.

- The majority of groups in the fourth grade made gains in mathematics performance, with only two -- students who attend schools in rural and in advantaged-urban communities -- showing no change. At a risk of redundancy, no groups of black fourth graders experienced a decline in mathematical performance.

- In the eighth grade, while the majority of groups experienced a decline, two groups gained: these were students who attend school in rural communities and those who live in fringes around big cities.

- In the 11th grade, while the majority of groups experienced a decline, students who attend schools in rural communities and in advantaged-urban communities, those who live in medium cities and who report having four categories of reading resources in their homes remained stable in mathematics performance.

In summary, Exhibits 2 and 3 indicate that more performance losses occurred in mathematics than in science or in reading for students in the lowest and highest achievement classes, whether white or black. Conversely, more performance gains occurred in reading than in mathematics or in science for students in the lowest and highest achievement classes, whether white or black. Additionally, more gains occurred for students in the lowest quartile of performance, whether white or black, regardless of learning area. Finally, the performance of black youngsters in the 4th and 8th grades at ages 9 and 13 tended to increase or to remain stable, while the performance of their white counterparts either declined or remained stable in all three learning areas. Both white and black high achievers in the 11th grade suffered substantial losses in mathematics and science.

Exhibit 4 graphically displays an overview of the findings just described and allows us to see the general direction of performance changes for white and black students, in the lowest and highest quartiles, in 4th, 8th and 11th grades. Supporting figures for Exhibit 4 appear in Table 14.

EXHIBIT 4. Changes in Lowest and Highest Achievement Classes in Reading, Science and Mathematics for White and Black Students in Modal Grades

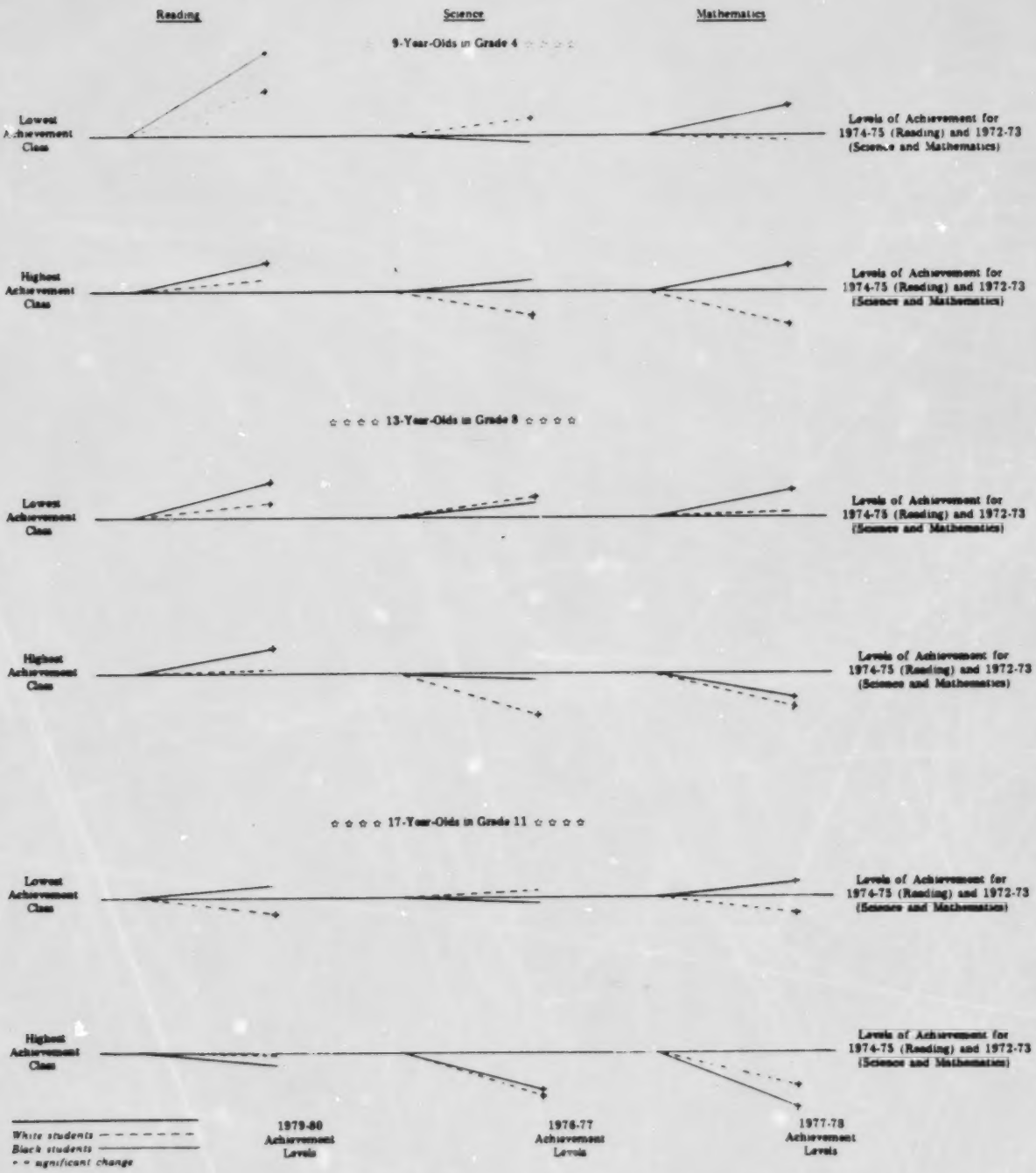

TABLE 14. Mean Percentage Changes Between Two Assessments in Lowest and Highest Achievement Classes in Reading, Science and Mathematics for White and Black Students in Modal Grades

	Black			White		
	Reading	Science	Mathematics	Reading	Science	Mathematics
Lowest Achievement Class						
9-year-olds	8.4*	-0.7	2.9*	4.6*	1.7*	-0.5
13-year-olds	3.5*	1.3	2.6*	1.5*	2.0*	0.3
17-year-olds	1.1	-0.5	1.6*	-1.7*	0.7	-1.8*
Highest Achievement Class						
9-year-olds	3.0*	1.1	2.6*	1.2	-2.4*	-3.3*
13-year-olds	2.5*	-0.5	-2.5*	0.4	-4.1*	-3.2*
17-year-olds	-1.1	-3.9*	-5.5*	-0.3	-4.2*	-4.3*

*Asterisk indicates significant change in performance between assessments.

APPENDIX A

MEAN CHANGES IN PERFORMANCE WITHIN LOWEST AND HIGHEST ACHIEVEMENT CLASSES FOR WHITE AND BLACK STUDENTS IN THE MODAL GRADE

The tables present mean percentages of changes in performance for white and black students in the modal grade, within the lowest and highest achievement classes, at ages 9, 13 and 17. Each table displays the data for a selected reporting category: for example, white and black students, in the modal grades, in achievement class 1 and achievement class 4 by regions of the country. Data are provided also for national changes in performance for the modal grades. Estimated standard errors for all changes reported in this appendix are available from the National Assessment upon request.

TABLE A-1. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Region**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	4.2%*	1.4%*	11.5%*	3.9%*
Northeast	7.8*	1.0	16.0*	3.3*
Southeast	5.3*	1.9*	10.9*	4.6*
Central	3.7*	1.2	9.0*	3.1*
West	4.1*	1.8*	5.8*	2.8*
		Age 13		
Nation: modal grade	0.9	0.4	3.6*	2.9*
Northeast	0.5	0.2	3.9*	3.3*
Southeast	1.6*	0.7	2.2*	5.5*
Central	-0.9	0.4	4.9*	-0.1
West	2.7*	0.5	3.5*	4.4*
		Age 17 (In School)		
Nation: modal grade	-1.6*	-0.4	1.5*	-2.0*
Northeast	-1.7*	-0.3	5.6*	-3.0*
Southeast	-0.9	0.0	3.0*	-2.2*
Central	-2.9*	-1.0	-3.6*	0.8
West	0.0	0.2	-0.8	-6.4*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-2. Mean Changes in Modal Grade Science Performance Within Lowest and Highest Achievement Classes by Race and Region**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	1.4%*	-2.5%*	-0.6%	1.0%
Northeast	2.8*	-1.6*	-0.1	3.2*
Southeast	1.1	-3.7*	-1.2	0.6
Central	1.3	-2.3*	-2.6*	1.1
West	0.7	-3.1*	5.1*	0.0
		Age 13		
Nation: modal grade	1.6*	-2.0*	1.6*	-1.5*
Northeast	0.6	-2.8*	6.4*	-0.5
Southeast	3.8*	-1.7*	2.6*	-1.6*
Central	0.8	-2.1*	-1.7*	-3.1*
West	1.5*	-1.6*	1.1	-3.0*
		Age 17 (In School)		
Nation: modal grade	1.0	-4.0*	-0.6	-3.4*
Northeast	1.2	-3.3*	-1.7*	-8.0*
Southeast	2.5*	-3.8*	0.5	-0.5
Central	0.7	-3.7*	-0.8	-6.8*
West	0.0	-5.1*	-1.6	-3.1*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-3. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Region**

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation: modal grade	0.2%	-3.2%*	2.6%*	3.7%*
Northeast	3.0*	-2.2*	2.1*	4.4*
Southeast	-0.3	-1.2*	2.4*	4.4*
Central	-0.2	-5.1*	1.2*	3.5*
West	0.2	-2.1*	9.6*	2.3*
		Age 13		
Nation: modal grade	-0.4	-2.8*	1.9*	-2.7*
Northeast	-0.2	-2.5*	-0.7	-0.2
Southeast	0.1	-0.7	2.4*	-3.7*
Central	-0.6	-3.5*	0.5	-4.6*
West	-0.5	-3.6*	1.1	-1.5
		Age 17 (In School)		
Nation: modal grade	-1.7*	-4.2*	1.5*	-5.8*
Northeast	-2.5*	-3.6*	4.4*	-8.2*
Southeast	-2.2*	-4.8*	0.7	-2.6*
Central	0.1	-4.3*	-1.7*	-6.6*
West	-2.9*	-3.8*	1.0	-9.6*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-4. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Sex**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	4.2%*	1.4%*	11.5%*	3.9%*
Males	4.3*	1.6*	11.0*	3.8*
Females	4.0*	1.2	12.1*	3.9*
		Age 13		
Nation: modal grade	0.9	0.4	3.6*	2.9*
Males	1.2	0.0	4.4*	2.8*
Females	0.6	0.7	2.8*	3.1*
		Age 17 (In School)		
Nation: modal grade	-1.6*	-0.4	1.5*	-2.0*
Males	-2.2*	-0.4	3.1*	-1.6
Females	-0.8	-0.3	-0.4	-2.2*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-5. Mean Changes in Modal Grade Science Performance**
Within Lowest and Highest Achievement Classes
by Race and Sex

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	1.4%*	-2.5%*	-0.6%	1.0%
Male	0.9	-2.6*	-2.9*	0.4
Female	1.8*	-2.6*	1.2	1.2
		Age 13		
Nation: modal grade	1.6*	-2.0*	1.6*	-1.5*
Male	2.6*	-1.4*	1.1	-0.7
Female	1.1	-3.1*	2.1*	-1.8*
		Age 17 (In School)		
Nation: modal grade	1.0	-4.0*	-0.6	-3.4*
Male	1.3	-4.0*	0.5	-4.1*
Female	0.9	-4.6*	-1.1	-2.3*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-6. Mean Changes in Modal Grade Mathematics Performance**
Within Lowest and Highest Achievement Classes
by Race and Sex

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation: modal grade	0.2%	-3.2%*	2.6%*	3.7%*
Males	0.1	-3.1*	1.9*	3.6*
Females	0.1	-3.4*	3.0*	4.0*
		Age 13		
Nation: modal grade	-0.4	-2.8*	1.9*	-2.7*
Males	-0.1	-2.6*	1.6*	-3.5*
Females	-0.7	-3.1*	2.1*	-2.1*
		Age 17 (In School)		
Nation: modal grade	-1.7*	-4.2*	1.5*	-5.8*
Males	-1.2	-3.8*	0.2	-4.5*
Females	-2.0*	-4.8*	1.8*	-6.8*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-7. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Level of Parental Education**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	4.2%*	1.4%*	11.5%*	3.9%*
Not graduated high school	4.2*	1.0	6.8*	2.4
Graduated high school	5.1*	1.8*	11.2*	3.0*
Post high school	3.2*	1.1	9.6*	3.9*
		Age 13		
Nation: modal grade	0.9	0.4	3.6*	2.9*
Not graduated high school	1.4	1.6*	4.7*	5.8*
Graduated high school	0.7	0.4	1.0	3.7*
Post high school	0.4	0.3	4.0*	1.7*
		Age 17 (In School)		
Nation: modal grade	-1.6*	-0.4	1.5*	-2.0*
Not graduated high school	-2.8*	-1.3	-0.6	-0.5
Graduated high school	-1.9*	-0.2	0.9	-2.5*
Post high school	-1.5*	-0.4	1.6	-2.8*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-8. Mean Changes in Modal Grade Science Performance**
Within Lowest and Highest Achievement Classes
by Race and Level of Parental Education

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	1.4%*	-2.5%*	-0.6%	1.0%
Not graduated high school	1.2	-0.1	-5.3*	-4.8*
Graduated high school	1.9*	-3.9*	0.2	1.2
Post high school	0.0	-2.3*	-0.8	-0.2
		Age 13		
Nation: modal grade	1.6*	-2.0*	1.6*	-1.5*
Not graduated high school	3.0*	-1.6*	2.4*	-1.2
Graduated high school	1.7*	-2.1*	1.4	-1.6*
Post high school	0.8	-2.1*	1.4	-0.7
		Age 17 (In School)		
Nation: modal grade	1.0	-4.0*	-0.6	-3.4*
Not graduated high school	1.8*	-0.4	-2.4*	-1.7*
Graduated high school	1.1	-4.0*	-1.1	-2.2*
Post high school	0.7	-4.3*	2.8*	-4.6*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-9. Mean Changes in Modal Grade Mathematics Performance**
Within Lowest and Highest Achievement Classes
by Race and Level of Parental Education

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation: modal grade	0.2%	-3.2%*	2.6%*	3.7%*
Not graduated high school	-1.2	3.5*	2.2*	8.5*
Graduated high school	1.2	-3.2*	3.3*	5.1*
Post high school	-0.5	-3.5*	1.2*	1.9*
		Age 13		
Nation: modal grade	-0.4	-2.8*	1.9*	-2.7*
Not graduated high school	0.3	-2.2*	5.1*	-4.5*
Graduated high school	-0.2	-3.7*	2.3*	-3.2*
Post high school	-1.0	-2.3*	0.8*	-1.7*
		Age 17 (In School)		
Nation: modal grade	-1.7*	-4.2*	1.5*	-5.8*
Not graduated high school	-2.5*	-5.5*	-0.2	-6.8*
Graduated high school	-1.6*	-4.0*	1.2*	-9.0*
Post high school	-1.9*	-4.3*	1.6*	-3.3*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-10. Mean Changes in Modal Grade Reading Performance**
Within Lowest and Highest Achievement Classes
by Race and Type of Community

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	4.2%*	1.4%*	11.5%*	3.9%*
Rural	3.9*	0.8	8.4*	4.5*
Disadvantaged urban	2.8*	0.7	12.0*	3.7*
Advantaged urban	3.6*	2.0*	20.4*	2.0
		Age 13		
Nation: modal grade	0.9	0.4	3.6*	2.9*
Rural	0.3	0.2	2.0	10.7*
Disadvantaged urban	3.2*	2.1*	2.7*	2.5*
Advantaged urban	0.7	0.7	-8.7*	-0.7
		Age 17 (In School)		
Nation: modal grade	-1.6*	-0.4	1.5*	-2.0*
Rural	-0.6	-0.1	3.8*	-3.5*
Disadvantaged urban	-3.0*	-1.2	0.0	0.5
Advantaged urban	-0.5	-0.7	0.8	-6.5*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-11. Mean Changes in Modal Grade Science Performance Within Lowest and Highest Achievement Classes by Race and Type of Community**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	1.4%*	-2.5%*	-0.6%	1.0%
Rural	1.9*	-4.0*	5.5*	2.2
Disadvantaged urban	0.7	-3.3*	-1.4	1.7*
Advantaged urban	5.5*	-1.9*	-1.2	2.1*
		Age 13		
Nation: modal grade	1.6*	-2.0*	1.6*	-1.5*
Rural	3.4*	-1.8*	1.1	-20.2*
Disadvantaged urban	0.4	-4.4*	3.6*	-2.2*
Advantaged urban	1.6*	-2.2*	10.9*	2.7*
		Age 17 (In School)		
Nation: modal grade	1.0	-4.0*	-0.6	-3.4*
Rural	-3.2*	-2.4*	7.2*	1.2
Disadvantaged urban	1.4	1.3	0.2	-4.6*
Advantaged urban	0.1	-5.2*	3.0*	-8.8*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-12. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Type of Community**

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation: modal grade	0.2%	-3.2%*	2.6%*	3.7%*
Rural	-1.6*	-5.3*	5.4*	1.7
Disadvantaged urban	3.4*	-0.3	2.3*	3.5*
Advantaged urban	1.7*	-2.2*	10.0*	1.6
		Age 13		
Nation: modal grade	-0.4	-2.8*	1.9*	-2.7*
Rural	1.2	-7.2*	4.8*	4.8*
Disadvantaged urban	0.4	-7.9*	1.5*	-4.7*
Advantaged urban	-0.7	-1.6*	undefined	-1.2
		Age 17 (In School)		
Nation: modal grade	-1.7*	-4.2*	1.5*	-5.8*
Rural	-0.5	-2.6*	-4.0*	-7.4*
Disadvantaged urban	-3.7*	-8.1*	1.8*	-7.9*
Advantaged urban	-0.9	-4.1*	-11.5*	-1.2

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-13. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Reading Resources**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	4.2%*	1.4%*	11.5%*	3.9%*
<3 categories	3.4*	1.1	10.0*	3.6*
3 categories	4.5*	1.8*	11.6*	4.9*
4 categories	4.4*	1.2	14.6*	2.9*
		Age 13		
Nation: modal grade	0.9	0.4	3.6*	2.9*
<3 categories	2.3*	1.0	4.8*	1.8
3 categories	0.2	0.4	1.6	3.4*
4 categories	0.7	0.4	4.0*	2.7*
		Age 17 (In School)		
Nation: modal grade	-1.6*	-0.4	1.5*	-2.0*
<3 categories	-1.2	-0.7	0.8	1.0
3 categories	-0.7	-0.6	2.7*	-0.8
4 categories	-1.8*	-0.3	2.3*	-2.8*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-14. Mean Changes in Modal Grade Science Performance**
Within Lowest and Highest Achievement Classes
by Race and Reading Resources

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	1.4%*	-2.5%*	-0.6%	1.0%
<3 categories	1.8*	-2.3*	0.2	-1.4
3 categories	0.9	-2.2*	-2.2*	1.4
4 categories	1.8*	-2.5*	1.7	2.5*
		Age 13		
Nation: modal grade	1.6*	-2.0*	1.6*	-1.5*
<3 categories	2.1*	-2.4*	1.4	-3.8*
3 categories	2.0*	-1.5*	0.9	-2.5*
4 categories	1.5*	-2.1*	4.2*	0.5
		Age 17 (In School)		
Nation: modal grade	1.0	-4.0*	-0.6	-3.4*
<3 categories	1.3	-4.4*	-2.4*	-7.3*
3 categories	1.1	-5.5*	-0.7	-2.2*
4 categories	1.0	-3.7*	2.7*	-3.2*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-15. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Reading Resources**

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
Age 9				
Nation: modal grade	0.2%	-3.2%*	2.6%*	3.7%*
<3 categories	-0.8	-2.4*	2.6*	4.0*
3 categories	0.5	-2.4*	2.2*	4.8*
4 categories	1.1	-4.0*	2.2*	2.0*
Age 13				
Nation: modal grade	-0.4	-2.8*	1.9*	-2.7*
<3 categories	0.5	-3.6*	2.9*	-4.8*
3 categories	-0.9	-2.6*	0.9	-3.4*
4 categories	-0.2	-2.8*	1.4	-2.3*
Age 17 (In School)				
Nation: modal grade	-1.7*	-4.2*	1.5*	-5.8*
<3 categories	-1.2	-3.3*	1.8*	-5.6*
3 categories	-0.9	-3.0*	1.5*	-4.2*
4 categories	-1.4*	-4.3*	1.6*	-6.0*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-16. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Size of Community**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	4.2%*	1.4%*	11.5%*	3.9%*
Big cities	5.7*	2.1*	12.3*	4.1*
Fringes around big cities	4.3*	1.5	10.2*	3.7*
Medium cities	4.5*	1.4	15.5*	7.7*
Smaller places	3.8*	1.1	10.2*	3.8*
		Age 13		
Nation: modal grade	0.9	0.4	3.6*	2.9*
Big cities	2.3*	0.7	3.8*	2.1*
Fringes around big cities	1.6*	0.9	0.4	4.0*
Medium cities	1.1	-0.5	6.8*	2.0
Smaller places	0.3	0.4	2.1*	4.2*
		Age 17 (In School)		
Nation: modal grade	-1.6*	-0.4	1.5*	-2.0*
Big cities	-1.4	-0.5	0.3	-2.1*
Fringes around big cities	-0.8	-0.2	-0.8	1.9
Medium cities	-1.3	-0.5	4.2*	-2.9*
Smaller places	-1.6*	-0.4	1.3	-1.9*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-17. Mean Changes in Modal Grade Science Performance**
Within Lowest and Highest Achievement Classes
by Race and Size of Community

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	1.4%*	-2.5%*	-0.6%	1.0%
Big cities	0.5	-2.0*	0.6	0.6
Fringes around big cities	2.5*	-1.9*	-1.5	4.6*
Medium cities	1.6*	-2.4*	-1.2	3.0*
Smaller places	1.5*	-2.9*	-2.5*	0.1
		Age 13		
Nation: modal grade	1.6*	-2.0*	1.6*	-1.5*
Big cities	0.7	-1.7*	2.3*	-1.3
Fringes around big cities	2.4*	-2.6*	2.6*	-1.5
Medium cities	2.2*	-0.4	0.0	-4.5*
Smaller places	2.0*	-2.3*	2.0*	-1.2
		Age 17 (In School)		
Nation: modal grade	1.0	-4.0*	-0.6	-3.4*
Big cities	1.7*	-2.3*	-0.7	-5.1*
Fringes around big cities	1.2	-4.5*	5.8*	0.3
Medium cities	0.6	-4.6*	-5.2*	1.6
Smaller places	0.6	-4.0*	-0.5	-5.3*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-18. Mean Changes in Modal Grade Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Size of Community**

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation: modal grade	0.2%	-3.2%*	2.6%*	3.7%*
Big cities	-1.6*	-4.0*	2.8*	2.9*
Fringes around big cities	0.9	-2.9*	4.8*	4.1*
Medium cities	3.2*	-2.2*	6.2*	3.5*
Smaller places	-0.1	-3.2*	1.8*	4.3*
		Age 13		
Nation: modal grade	-0.4	-2.3*	1.9*	-2.7*
Big cities	-0.6	-3.7*	0.8	-4.0*
Fringes around big cities	-1.1	-2.1*	7.5*	2.1*
Medium cities	2.5*	-1.7*	16.9*	-4.2*
Smaller places	-0.5	-3.3*	1.3	-3.6*
		Age 17 (In School)		
Nation: modal grade	-1.7*	-4.2*	1.5*	-5.8*
Big cities	-0.9	-3.9*	1.9*	-8.1*
Fringes around big cities	-2.3*	-3.5*	1.4	-4.8*
Medium cities	-4.2*	-4.2*	15.2*	0.9
Smaller places	-1.0	-4.7*	0.5	-3.6*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-19. Mean Changes in Modal Grade Reading Performance Within Lowest and Highest Achievement Classes by Race and Title I Eligibility**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	4.2%*	1.4%*	11.5%*	3.9%*
Yes Title I	4.6*	1.1	11.9*	4.3*
No Title I	3.4*	1.7*	9.5*	2.9*
		Age 13		
Nation: modal grade	0.9	0.4	3.6*	2.9*
Yes Title I	1.3	0.3	2.4*	2.2*
No Title I	0.6	0.6	5.1*	3.5*
		Age 17 (In School)		
Nation: modal grade	-1.6*	-0.4	1.5*	-2.0*
Yes Title I	-1.6*	-0.4	2.8*	-0.3
No Title I	-1.6*	-0.4	0.6	-3.3*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-20. Mean Changes in Modal Grade Science Performance Within Lowest and Highest Achievement Classes by Race and Title I Eligibility**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	1.4%*	-2.5%*	-0.6%	1.0%
Yes Title I	1.8*	1.9*	-1.0	1.1
No Title I	0.8	-3.2*	2.5*	0.7
		Age 13		
Nation: modal grade	1.6*	-2.0*	1.6*	-1.5*
Yes Title I	1.7*	-2.2*	2.4*	-2.9*
No Title I	1.5*	-2.0*	0.6	-0.8
		Age 17 (In School)		
Nation: modal grade	1.0	-4.0*	-0.6	-3.4*
Yes Title I	1.1	-3.3*	0.0	-5.5*
No Title I	0.9	-4.4*	-1.2	-2.4*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-21. Mean Changes in Modal Grade Mathematics Performance**
Within Lowest and Highest Achievement Classes
by Race and Title I Eligibility

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation: modal grade	0.2%	-3.2%*	2.6%*	3.7%*
Yes Title I	-0.2	-3.1*	2.6*	3.2*
No Title I	0.8	-2.7*	2.9*	5.7*
		Age 13		
Nation: modal grade	-0.4	-2.8*	1.9*	-2.7*
Yes Title I	-0.2	-3.0*	2.2*	-4.1*
No Title I	-0.5	-2.7*	1.8*	-3.2*
		Age 17 (In School)		
Nation: modal grade	-1.7*	-4.2*	1.5*	-5.8*
Yes Title I	-0.9	-3.4*	2.1*	-7.9*
No Title I	-2.3*	-4.8*	1.0	-5.2*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-22. Mean Changes in Modal Grade Reading Performance**
Within Lowest and Highest Achievement Classes
by Race and Percent White Enrollment

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	4.2%*	1.4%*	11.5%*	3.9%*
0-59% white school	4.5*	0.4	12.2*	3.8*
60-100% white school	4.2*	1.5*	9.2*	4.0*
		Age 13		
Nation: modal grade	0.9	0.4	3.6*	2.9*
0-59% white school	1.3	1.1	3.6*	2.5*
60-100% white school	1.0	0.4	3.3*	4.7*
		Age 17 (In School)		
Nation: modal grade	-1.6*	-0.4	1.5*	-2.0*
0-59% white school	-1.8*	0.0	0.5	-1.5
60-100% white school	-1.6*	-0.4	3.2*	-3.1*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-23. Mean Changes in Modal Grade Science Performance**
Within Lowest and Highest Achievement Classes
by Race and Percent White Enrollment

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation: modal grade	1.4%*	-2.5%*	-0.6%	1.0%
0-59% white school	2.8*	-3.7*	-0.3	1.7*
60-100% white school	1.2	-2.4*	-0.8	-0.3
		Age 13		
Nation: modal grade	1.6*	-2.0*	1.6*	-1.5*
0-59% white school	-0.4	1.3	0.9	-1.6*
60-100% white school	1.9*	-2.2*	4.4*	-1.0
		Age 17 (In School)		
Nation: modal grade	1.0	-4.0*	-0.6	-3.4*
0-59% white school	1.6*	-3.0*	-0.6	-3.9*
60-100% white school	0.9	-4.0*	-0.3	-3.0*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

TABLE A-24. Mean Changes in Modal Grade Mathematics Performance**
Within Lowest and Highest Achievement Classes
by Race and Percent White Enrollment

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation: modal grade	0.2%	-3.2%*	2.6%*	3.7%*
0-59% white school	1.0	-1.9*	2.7*	6.8*
60-100% white school	0.2	-3.2*	2.6*	3.6*
		Age 13		
Nation: modal grade	-0.4	-2.8*	1.9*	-2.7*
0-59% white school	-0.5	-5.7*	2.4*	-2.9*
60-100% white school	-0.1	-2.7*	1.3	-2.8*
		Age 17 (In School)		
Nation: modal grade	-1.7*	-4.2*	1.5*	-5.8*
0-59% white school	-1.5*	-6.1*	1.6*	-8.9*
60-100% white school	-1.6*	-4.0*	1.8*	-2.3*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students in modal grades.

APPENDIX B

MEAN CHANGES IN PERFORMANCE WITHIN LOWEST AND HIGHEST ACHIEVEMENT CLASSES FOR ALL WHITE AND ALL BLACK STUDENTS

The tables present mean percentages of changes in performance for all white and all black students, within the lowest and highest achievement classes, at ages 9, 13 and 17. Each table displays the data for a selected reporting category: for example, all white and all black students, in achievement class 1 and achievement class 4 by regions of the country. Data are provided also for national changes in performance. Estimated standard errors for all changes reported in this appendix are available from the National Assessment upon request.

TABLE B-1. Mean Changes in Reading Performance**
Within Lowest and Highest Achievement Classes
by Race and Region

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	4.1%*	1.2%	7.3%*	3.0%*
Northeast	5.5*	0.8	9.9*	2.8*
Southeast	4.8*	1.6*	7.2*	3.5*
Central	4.3*	1.2	8.1*	2.8*
West	2.1*	1.3	3.4*	2.5*
		Age 13		
Nation	1.2	0.4	2.5*	2.4*
Northeast	1.6*	-0.1	2.8*	2.4*
Southeast	0.6	0.7	1.1	3.3*
Central	0.8	0.5	2.5*	0.5
West	1.8*	0.5	6.4*	3.2*
		Age 17 (In School)		
Nation	1.4*	-0.2	0.2	-1.7*
Northeast	-3.0*	-0.1	3.3*	-2.5*
Southeast	-1.1	0.5	0.0	-1.5
Central	-2.0*	-1.0	-5.2*	1.1
West	0.0	0.3	0.1	-5.7*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-2. Mean Changes in Science Performance**
Within Lowest and Highest Achievement Classes
by Race and Region

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	1.3%*	-2.4%*	-0.2%	0.0%
Northeast	1.1	-2.1*	1.1	3.0*
Southeast	0.8	-3.7*	-1.5*	-0.5
Central	2.4*	-2.2*	-1.5	0.6
West	0.1	-2.3*	4.9*	-2.3*
		Age 13		
Nation	1.6*	-2.4*	2.3*	-0.6
Northeast	1.2	-2.9*	5.6*	-0.3
Southeast	3.0*	-2.2*	2.9*	-1.4
Central	1.6*	-2.2*	0.4	-2.7*
West	0.6	-2.8*	-0.2	-0.5
		Age 17 (In School)		
Nation	1.0	-3.8*	0.7	-4.3*
Northeast	1.8*	-3.2*	2.3*	-6.2*
Southeast	1.6*	-3.3*	0.6	-1.9*
Central	0.6	-4.0*	-0.1	-6.7*
West	0.2	-4.8*	0.0	-5.1*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-3. Mean Changes in Mathematics Performance**
Within Lowest and Highest Achievement Classes
by Race and Region

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation	0.3%	-3.3%*	2.8%*	2.7%*
Northeast	1.3	-2.1*	3.8*	4.4*
Southeast	-0.3	-2.2*	2.5*	2.6*
Central	0.3	-5.2*	-0.1	1.6
West	0.7	-1.7*	6.8*	1.8*
		Age 13		
Nation	0.6	-3.2*	2.8*	-2.5*
Northeast	0.7	-2.8*	3.8*	-1.9*
Southeast	0.5	-1.3	2.8*	-2.1*
Central	1.3*	-4.0*	3.6*	-3.8*
West	-0.1	-3.9*	2.4*	-1.6*
		Age 17 (In School)		
Nation	-1.7*	-4.2*	1.3*	-4.6*
Northeast	-1.3	-3.4*	5.7*	-6.7*
Southeast	-2.4*	-4.6*	0.9	-2.6*
Central	-0.3	-4.5*	-2.5*	-4.9*
West	-3.2*	-4.4*	-0.3	-3.0*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-4. Mean Changes in Modal Grade Reading Performance**
Within Lowest and Highest Achievement Classes
by Race and Sex

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	4.1%*	1.2%*	7.3%*	3.0%*
Males	4.0*	1.4*	6.9*	2.7*
Females	4.1*	1.0	8.0*	3.4*
		Age 13		
Nation	1.2	0.4	2.5*	2.4*
Males	1.0	0.2	2.7*	3.0*
Females	1.3	0.5	2.1*	2.0*
		Age 17 (In School)		
Nation	-1.4*	-0.2	0.2	-1.7*
Males	-1.8*	-0.3	-0.5	-2.1*
Females	-0.8	-0.1	0.8	-1.0

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-5. Mean Changes in Science Performance Within Lowest and Highest Achievement Classes by Race and Sex**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	1.3%*	-2.4%*	-0.2%	0.0%
Male	1.4*	-2.5*	0.8	-1.3
Female	1.2	-2.5*	0.7	1.2
		Age 13		
Nation	1.6*	-2.4*	2.3*	-0.6
Male	2.0*	-1.7*	1.8*	0.4
Female	1.4*	-3.7*	2.7*	-1.5*
		Age 17 (In School)		
Nation	1.0	-3.8*	0.7	-4.3*
Male	11.4*	-3.9*	0.8	-6.0*
Female	1.0	-4.3*	0.6	-2.7*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-6. Mean Changes in Mathematics Performance**
Within Lowest and Highest Achievement Classes
by Race and Sex

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation	0.3%	-3.3%*	2.8%*	2.7%*
Males	0.2	-3.2*	1.9*	3.4*
Females	0.2	-3.6*	4.0*	2.4*
		Age 13		
Nation	0.6	-3.2*	2.8*	-2.5*
Males	1.2	-3.0*	2.6*	-2.4*
Females	0.0	-3.5*	3.1*	-2.4*
		Age 17 (In School)		
Nation	-1.7*	-4.2*	1.3*	-4.6*
Males	-1.2*	-4.1*	0.9	-4.6*
Females	-2.0*	-4.5*	1.7*	-4.5*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-7. Mean Changes in Reading Performance**
Within Lowest and Highest Achievement Classes
by Race and Level of Parental Education

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	4.1%*	1.2%	7.3%*	3.0%*
Not graduated high school	1.8*	1.3	4.6*	1.2
Graduated high school	3.5*	1.4*	4.5*	2.6*
Post high school	3.4*	0.9	5.5*	2.8*
		Age 13		
Nation	1.2	0.4	2.5*	2.4*
Not graduated high school	1.6*	1.5	2.5*	3.5*
Graduated high school	0.8	-0.2	2.4*	3.1*
Post high school	1.2	0.4	2.4*	1.2
		Age 17 (In School)		
Nation	-1.4*	-0.2	0.2	-1.7*
Not graduated high school	-2.9*	-1.2	0.5	-0.3
Graduated high school	-1.5*	-0.1	0.5	-3.3*
Post high school	-1.6*	-0.2	0.8	-2.2*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-8. Mean Changes in Science Performance**
Within Lowest and Highest Achievement Classes
by Race and Level of Parental Education

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	1.3%*	-2.4%*	-0.2%	0.0%
Not graduated high school	0.8	-1.5	-3.2*	-7.8*
Graduated high school	1.2	-3.0*	1.7*	0.7
Post high school	0.8	-2.4*	-2.0*	-0.1
		Age 13		
Nation	1.6*	-2.4*	2.3*	-0.6
Not graduated high school	2.5*	-2.5*	2.0*	0.0
Graduated high school	2.2*	-2.8*	2.6*	-1.0
Post high school	0.5	-2.2*	2.0*	0.0
		Age 17 (In School)		
Nation	1.0	-3.8*	0.7	-4.3*
Not graduated high school	1.6*	-2.3*	-2.0*	-2.0*
Graduated high school	1.2	-4.0*	1.1	-3.2*
Post high school	0.7	-4.1*	2.1*	-5.9*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-9. Mean Changes in Mathematics Performance**
Within Lowest and Highest Achievement Classes
by Race and Level of Parental Education

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation	0.3%	-3.3%*	2.8%*	2.7%*
Not graduated high school	-0.4	0.7	3.6*	6.1*
Graduated high school	-0.2	-3.8*	2.9*	3.6*
Post high school	0.9	-3.1*	1.0	2.2*
		Age 13		
Nation	0.6	-3.2*	2.8*	-2.5*
Not graduated high school	0.2	-3.5*	2.9*	-0.9
Graduated high school	1.3	-4.2*	2.1*	-3.6*
Post high school	-0.3	-2.7*	3.7*	-2.6*
		Age 17 (In School)		
Nation	-1.7*	-4.2*	1.3*	-4.6*
Not graduated high school	-2.2*	-5.9*	1.5*	-5.2*
Graduated high school	-2.0*	-4.0*	1.2	-6.9*
Post high school	-2.0*	-4.3*	1.2	-2.2*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-10. Mean Changes in Reading Performance**
Within Lowest and Highest Achievement Classes
by Race and Type of Community

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	4.1%*	1.2%	7.3%*	3.0%*
Rural	5.7*	0.7	9.6*	4.2*
Disadvantaged urban	7.5*	1.1	6.9*	2.9*
Advantaged urban	4.7*	1.7*	7.2*	2.8*
		Age 13		
Nation	1.2	0.4	2.5*	2.4*
Rural	1.5*	-0.3	3.3*	6.6*
Disadvantaged urban	3.2*	1.5	2.4*	2.4*
Advantaged urban	2.3*	0.6	0.6	-0.7
		Age 17 (In School)		
Nation	-1.4*	-0.2	0.2	-1.7*
Rural	-0.7	0.0	0.8	-4.0*
Disadvantaged urban	-0.9	-0.7	0.9	-0.3
Advantaged urban	-1.3	-0.7	6.8*	-7.6*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-11. Mean Changes in Science Performance Within Lowest and Highest Achievement Classes by Race and Type of Community**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	1.3%*	-2.4%*	-0.2%	0.0%
Rural	1.5*	-3.7*	-2.1	0.5
Disadvantaged urban	1.4	-2.2*	-0.8	0.6
Advantaged urban	4.3*	-1.7*	2.0	1.9
		Age 13		
Nation	1.6*	-2.4*	2.3*	-0.6*
Rural	4.1*	-2.6*	0.6	-18.5*
Disadvantaged urban	1.7*	-3.6*	4.3*	-1.8*
Advantaged urban	1.3	-2.4*	0.6	1.4
		Age 17 (In School)		
Nation	1.0	-3.8*	0.7	-4.3*
Rural	-2.2*	-1.4	1.4*	2.1
Disadvantaged urban	-0.1	0.2	1.7*	-6.5*
Advantaged urban	1.4*	-5.0*	6.7*	-14.1*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-12. Mean Changes in Mathematics Performance Within Lowest and Highest Achievement Classes by Race and Type of Community**

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation	0.3%	-3.3%*	2.8%*	2.7%*
Rural	0.5	-5.6*	1.1	2.5*
Disadvantaged urban	2.1*	-3.7*	3.5*	2.5*
Advantaged urban	0.1	-2.6*	9.5*	3.0*
		Age 13		
Nation	0.6	-3.2*	2.8*	-2.5*
Rural	-1.2	-7.8*	2.3*	0.3
Disadvantaged urban	5.2*	-7.0*	4.0*	2.3*
Advantaged urban	-1.0	-2.1*	-4.0	-1.3
		Age 17 (In School)		
Nation	-1.7*	-4.2*	1.3*	-4.6*
Rural	-0.8	-3.0*	0.3	-3.1*
Disadvantaged urban	-2.7*	-6.6*	2.3*	-7.5*
Advantaged urban	-1.3	-4.4*	-1.3	-1.2

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-13. Mean Changes in Reading Performance**
Within Lowest and Highest Achievement Classes
by Race and Reading Resources

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	4.1%*	1.2%	7.3%*	3.0%*
<3 categories	3.1*	0.9	6.6*	3.8*
3 categories	3.8*	1.6*	7.5*	3.4*
4 categories	5.2*	0.9	10.4*	1.4*
		Age 13		
Nation	1.2	0.4	2.5*	2.4*
<3 categories	2.4*	0.9	1.9*	0.9
3 categories	0.5	0.5	2.4*	2.9*
4 categories	1.0	0.3	2.7*	2.2*
		Age 17 (In School)		
Nation	-1.4*	-0.2	0.2	-1.7*
<3 categories	-1.4	-0.5	0.0	-0.8
3 categories	-0.6	0.3	0.3	-0.2
4 categories	-1.5*	-0.1	2.0*	-2.0*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-14. Mean Changes in Science Performance**
Within Lowest and Highest Achievement Classes
by Race and Reading Resources

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	1.3%*	-2.4%*	-0.2%	0.0%
<3 categories	1.6*	-2.1*	0.2	-2.3*
3 categories	1.1	-2.4*	-1.8*	1.2
4 categories	1.6*	-2.4*	2.7*	1.3
		Age 13		
Nation	1.6*	-2.4*	2.3*	-0.6*
<3 categories	2.8	-2.0	1.6*	-3.6*
3 categories	1.3*	-2.7*	2.0*	-1.4
4 categories	1.4*	-2.4*	3.1*	1.2
		Age 17 (In School)		
Nation	1.0	-3.8*	0.7	-4.3*
<3 categories	0.9	-3.1*	0.5	-7.0*
3 categories	1.4*	-6.1*	0.1	-2.9*
4 categories	1.2	-3.5*	2.1*	-4.6*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-15. Mean Changes in Mathematics Performance**
Within Lowest and Highest Achievement Classes
by Race and Reading Resources

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation	0.3%	-3.3%*	2.8%*	2.7%*
<3 categories	0.3	-3.2*	2.5*	3.4*
3 categories	0.7	-3.0*	4.6*	3.7*
4 categories	-0.3	-3.8*	1.2	0.5
		Age 13		
Nation	0.6	-3.2*	2.8*	-2.5*
<3 categories	1.2	-2.7*	3.8*	-2.5*
3 categories	1.0	-3.5*	1.0	-4.7*
4 categories	-0.1	-3.1*	2.9*	-2.2*
		Age 17 (In School)		
Nation	-1.7*	-4.2*	1.3*	-4.6*
<3 categories	-1.4*	-4.4*	1.7*	-6.2*
3 categories	-1.4*	-3.0*	0.6	-3.2*
4 categories	-1.2	-4.3*	2.0*	-3.6*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-16. Mean Changes in Reading Performance Within Lowest and Highest Achievement Classes by Race and Size of Community**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	4.1%*	1.2%	7.3%*	3.0%*
Big cities	6.0*	1.9*	8.3*	3.4*
Fringes around big cities	3.9*	1.2	6.4*	3.6*
Medium cities	3.8*	1.2	8.6*	1.4
Smaller places	3.9*	1.1	6.5*	2.4*
		Age 13		
Nation	1.2	0.4	2.5*	2.4*
Big cities	2.3*	0.4	3.3*	1.2
Fringes around big cities	1.8*	0.7	3.9*	4.8*
Medium cities	2.9*	-0.2	3.2*	2.3*
Smaller places	0.3	0.3	0.5	2.6*
		Age 17 (In School)		
Nation	-1.4*	-0.2	0.2	-1.7*
Big cities	-0.1	-0.1	2.0*	-1.4
Fringes around big cities	-0.1	0.0	0.2	-1.8
Medium cities	-0.3	-0.3	-0.2	-0.6
Smaller places	-2.2*	-0.3	-1.7*	-2.9*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-17. Mean Changes in Science Performance**
Within Lowest and Highest Achievement Classes
by Race and Size of Community

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	1.3%*	-2.4%*	-0.2%	0.0%
Big cities	0.4	-1.2	0.8	0.2
Fringes around big cities	2.2*	-2.1*	3.5*	3.4*
Medium cities	2.4*	-2.1*	-2.8*	-0.3
Smaller places	0.9	-3.0*	-2.5*	0.0
		Age 13		
Nation	1.6*	-2.4*	2.3*	-0.6
Big cities	0.4	-2.8*	2.9*	-0.4
Fringes around big cities	2.6*	-2.6*	4.8*	-1.7*
Medium cities	1.5*	-1.5*	3.0*	-1.2
Smaller places	1.8*	-2.5*	1.5*	-1.3
		Age 17 (In School)		
Nation	1.0	-3.8*	0.7	-4.3*
Big cities	2.2*	-2.1*	0.7	-6.0*
Fringes around big cities	0.6	-4.6*	8.5*	1.1*
Medium cities	0.7	-4.6*	-3.7*	-0.1
Smaller places	1.0	-3.8*	-0.3	-5.3*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-18. Mean Changes in Mathematics Performance**
Within Lowest and Highest Achievement Classes
by Race and Size of Community

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation	0.3%	-3.3%*	2.8%*	2.7%*
Big cities	-0.6	-4.0*	3.0*	2.3*
Fringes around big cities	0.9	-3.0*	7.9*	1.6
Medium cities	0.5	-2.7*	-2.4*	0.1
Smaller places	0.3	-3.4*	2.1*	4.4*
		Age 13		
Nation	0.6	-3.2*	2.8*	-2.5*
Big cities	0.9	-3.8*	3.8*	1.1
Fringes around big cities	0.7	-2.8*	4.5*	2.2*
Medium cities	0.2	-1.7*	-0.8	4.3*
Smaller places	0.5	-3.8*	1.4	1.2
		Age 17 (In School)		
Nation	-1.7*	-4.2*	1.3*	-4.6*
Big cities	-1.4*	-4.1*	1.1	-6.4*
Fringes around big cities	-2.8*	-3.4*	2.2*	-3.5*
Medium cities	-4.6*	-4.7*	4.3*	1.3
Smaller places	-0.7	-4.9*	1.2	-3.4*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-19. Mean Changes in Reading Performance**
Within Lowest and Highest Achievement Classes
by Race and Title I Eligibility

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	4.1%*	1.2%	7.3%*	3.0%*
Yes Title I	3.6*	1.0	7.8*	3.2*
No Title I	4.7*	1.4*	4.5*	2.8*
		Age 13		
Nation	1.2	0.4	2.5*	2.4*
Yes Title I	0.8	0.1	1.6*	2.1*
No Title I	1.5*	0.6	4.2*	2.7*
		Age 17 (In School)		
Nation	-1.4*	-0.2	0.2	-1.7*
Yes Title I	-1.4*	-0.1	-0.4	-0.1
No Title I	-1.4*	-0.2	0.9	-2.8*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-20. Mean Changes in Science Performance**
Within Lowest and Highest Achievement Classes
by Race and Title I Eligibility

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	1.3%*	-2.4%*	-0.2%	0.0%
Yes Title I	1.4*	-1.8*	-0.5	0.1
No Title I	1.0	-3.1*	1.7	0.5
		Age 13		
Nation	1.6*	-2.4*	2.3*	-0.6
Yes Title I	1.6*	-2.2*	2.6*	-2.2*
No Title I	1.5*	-2.7*	1.8*	0.3
		Age 17 (In School)		
Nation	1.0	-3.8*	0.7	-4.3*
Yes Title I	1.4*	-3.5*	1.6*	-4.7*
No Title I	0.8	-4.1*	-0.5	-4.5*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-21. Mean Changes in Mathematics Performance**
Within Lowest and Highest Achievement Classes
by Race and Title I Eligibility

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation	0.3%	-3.3%*	2.8%*	2.7%*
Yes Title I	0.1	-3.4*	3.0*	1.9*
No Title I	0.7	-2.6*	1.6	5.7*
		Age 13		
Nation	0.6	-3.2*	2.8*	-2.5*
Yes Title I	0.8	-3.3*	2.6*	-3.8*
No Title I	0.1	-3.2*	3.7*	-2.6*
		Age 17 (In School)		
Nation	-1.7*	-4.2*	1.3*	-4.6*
Yes Title I	-0.8	-3.4*	3.0*	-6.2*
No Title I	-2.6*	-4.9*	0.3	-4.4*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-22. Mean Changes in Reading Performance**
Within Lowest and Highest Achievement Classes
by Race and Percent White Enrollment

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	4.1%*	1.2%	7.3%*	3.0%*
0-59% white school	2.8*	0.5	6.9*	2.9*
60-100% white school	4.2*	1.3	8.1*	3.1*
		Age 13		
Nation	1.2	0.4	2.5*	2.4*
0-59% white school	2.4*	1.2	3.2*	2.9*
60-100% white school	1.1	0.4	0.8	1.8*
		Age 17 (In School)		
Nation	-1.4*	-0.2	0.2	-1.7*
0-59% white school	0.2	0.4	0.3	-1.5*
60-100% white school	-1.6*	-0.2	-0.2	-2.1*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-23. Mean Changes in Science Performance Within Lowest and Highest Achievement Classes by Race and Percent White Enrollment**

	White		Black	
	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment	Achievement Class 1 2nd to 3rd Assessment	Achievement Class 4 2nd to 3rd Assessment
		Age 9		
Nation	1.3%*	-2.4%*	-0.2%	0.0%
0-59% white school	1.6*	-3.2*	-0.2	0.4
60-100% white school	1.3*	-2.4*	0.5	-0.8
		Age 13		
Nation	1.6*	-2.4*	2.3*	-0.6
0-59% white school	0.3	0.4	2.0*	-0.7
60-100% white school	1.9*	-2.6*	3.5*	-0.9
		Age 17 (In School)		
Nation	1.0	-3.8*	0.7	-4.3*
0-59% white school	1.3	-0.8	0.8	-5.2*
60-100% white school	1.0	-4.0*	1.0	-3.8*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

TABLE B-24. Mean Changes in Mathematics Performance**
Within Lowest and Highest Achievement Classes
by Race and Percent White Enrollment

	White		Black	
	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment	Achievement Class 1 1st to 2nd Assessment	Achievement Class 4 1st to 2nd Assessment
		Age 9		
Nation	0.3%	-3.3%*	2.8%*	2.7%*
0-59% white school	1.4	-2.3*	2.3*	3.0*
60-100% white school	0.2	-3.3*	3.5*	2.2*
		Age 13		
Nation	0.6	-3.2*	2.8*	-2.5*
0-59% white school	1.6*	-5.3*	3.5*	-2.2*
60-100% white school	0.7	-3.1*	0.2	-2.4*
		Age 17 (In School)		
Nation	-1.7*	-4.2*	1.3*	-4.6*
0-59% white school	-1.5*	-5.5*	1.8*	-6.8*
60-100% white school	-1.7*	-4.1*	0.1	-2.0*

*Asterisk indicates significant change in performance between assessments.
**Mean changes reflected in this table are based on achievement classes calculated separately for white and black students.

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